

WAUKESHA COUNTY

HAZARD IDENTIFICATION

AND

VULNERABILITY ANALYSIS

OFFICE OF EMERGENCY MANAGEMENT

June 2003

To the Reader:

A hazard identification and vulnerability analysis is the basis for effective emergency management planning. It allows public officials to develop an awareness of the disasters which could affect their community and an understanding of the probability and impact of such disasters. In turn, it enables decision-makers to set priorities and goals for planning and training and to effectively allocate resources on a day-to-day, as well as a disaster basis.

Waukesha County, lying in the Southeast corner of the State of Wisconsin, just west of Milwaukee County is vulnerable to a wide range of hazards, both natural and technological. Natural hazards such as floods, tornadoes, winter storms and excessive heat have caused injuries, loss of life, disruption of services, significant property damage and crop damage. Advancements in technology have resulted in a range of radiological, biological and chemical hazards, many unknown 20 or 30 years ago.

This hazard analysis describes those hazards which have occurred and/or are most likely to occur in Waukesha County. The description includes information on their frequency of occurrence and their potential or actual impacts. These hazards are the basis for the development of all county emergency management plans.

It is the mission of the Waukesha County Office of Emergency Management to coordinate the development and implementation of a comprehensive and integrated emergency management program designed to mitigate, prepare for, respond to and recover from the effects of all hazards which impact upon the welfare, safety and health of all County citizens.

Everyone has a responsibility to participate in the accomplishment of this mission.

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HAZARDS AFFECTING WAUKESHA COUNTY

Civil Disturbances

A civil disturbance is any act by an individual or group of persons with the intention to agitate or cause a public disturbance. These disturbances may come in the form of labor disputes or protests by groups on a special issue.

Waukesha County has been a low probability area for civil disturbances. Labor strikes have occurred in the past but have been generally peaceful and lacking in hostile actions. These labor strikes have generally occurred at contract time by truckers, state employees and local and national union members.

In a pending labor situation, the sheriff or police chief will meet with strike leaders to set up conduct guidelines for a lawful strike. Law enforcement officials should also review mutual aid pacts for additional support.

Prank bomb threats have been called in to a number of the schools, governmental offices and several businesses. To date, there has never been a bomb discovered but a number of objects have turned up that are explosive in nature. These include pipe bombs, military hardware and blasting supplies. There have also been several isolated instances of pipe bombs exploding and destroying property in close proximity.

Bomb threat policies and procedures should be developed for each school, hospital, business and government building. A number of these have already been developed with the assistance of Waukesha County's Office of Emergency Management.

Threats against government officials and others in top positions are generally made by persons who feel they have been unjustly wronged. So far in Waukesha County these threats have been minimal and have never been carried out.

Special events involving large numbers of people are required to obtain event permits to minimize disturbances. Police agencies will also use intelligence information when possible to gain advance data on potential problems. Current lists of phone numbers for agencies that can respond are available in the various emergency dispatch centers.

Dam Failures

Dam failures can result in loss of life and extensive property damage for miles downstream of the dam. Dams fail for many reasons. The most obvious reason is during a flood event when the dam isn't big enough to pass the large flow amount and the water overtops the dam. Failures don't always occur during flood events though. They can also be caused by poor operation, lack of maintenance, vandalism, etc. These are called "sunny day" failures and they can be catastrophic because the failure is unexpected and often without sufficient time to warn downstream residents.

Very few dams were built primarily to protect people and property from floods. Obviously, the few that do exist protect areas where high flood disaster potential exists downstream. Most flood control dams aren't immediately recognized as dams because most hold little or no water in the reservoir under normal conditions. Only during times of flooding are these dams holding large amounts of water. Since these dams are used only during floods, they present a special hazard. Everyday water related problems such as seepage can't be seen and corrected. When the floodwater does arrive, the dam is used to its fullest. For these reasons, flood control structures should be monitored continuously during flood events, have a trained operator, be inspected annually and after every flood and have regular maintenance.

Chapter 31 of Wisconsin State Statutes and Wisconsin Administrative Code NR 333, "Dam Design and Construction Standards" directly regulate dam safety activities. By virtue of these regulations, the Department of Natural Resources (DNR) has the authority to require a permit or plan approval to build a new dam or to modify existing ones. The DNR also has the authority to require dams be repaired to a safe condition or be abandoned and removed. Transferring a dam to a new owner requires approval by the DNR to assure the owner is financially capable of maintaining the structure. In addition, Administrative Code NR 116, "Wisconsin's Floodplain Management Program" recognizes the flooding potential of a dam failure by incorporating zoning in the floodplain created by the dam failure.

Waukesha County has 56 dams (See Appendix C) and most of them are the "mill" type which were built more than 50 years ago. If any of the mill type dams failed, the runoff would hardly be noticed downstream. There are also small dams for watering livestock and various recreational ponds around the county. Waukesha County has no electric power generating dams.

27 of the 56 dams Waukesha County has are considered to be large dams. State Statute 31.9 requires the DNR to inspect all large dams once every 10 years. A large dam is at least 6 feet in height and holds a reservoir of 50 acre-feet or more at maximum pool. A dam may be classified as large if it holds a smaller reservoir if its height is over 25 feet. Following a DNR inspection, a report, including pictures, is sent to the dam owner with the needed repairs outlined and a schedule for the completion of those repairs. The dam owner is responsible for making the repairs which may range from removing trees and brush from the earthen embankment or painting rusting parts to rebuilding the dam. The cost of the repairs is the responsibility of the dam owner.

Large dams are classified as high, significant or low hazard. Chapter NR 333 provides the standards to determine the hazard classification which includes two factors, the existing land use and the land use controls to guide future development in the hydraulic shadow. The hydraulic shadow is the floodplain created by the dam failing during the 100-year flood. For example, if no campgrounds or homes are in the hydraulic shadow and zoning is in place to protect future development, then the dam is low hazard. If the hydraulic shadow zoning is not in place, the dam is classified high hazard because there is no mechanism to assure future homes will not be built in a dangerous area.

The DNR has classified 6 county dams as high hazard, 10 significant hazard and 21 low hazard.

After the DNR dam inspection, all dams perceived as posing a threat to downstream development are required to have a dam failure analysis performed in order to identify the hydraulic shadow. This information is also used to develop an emergency action plan (EAP). The EAP must include provisions for a warning which may be directed to the affected downstream residents or to emergency authorities for assistance.

There have been five dam failures of record in Waukesha County. Three occurred in April 1973 after severe spring flooding. Three small earth dikes were overtapped and breached. Damage was minimal. The County did receive a Presidential Major Disaster Declaration for the flooding. Another occurred in March, 1980, when the main tainter gate pin suddenly broke at Lepper Dam causing both tainter gates to buckle and fail. The cause was attributed to the lack of reinforcing steel around the gate pin. There was no loss of life or property damage. In March, 1988, Bischel Dam failed and caused \$20,000 of road damage.

Mitigation by Waukesha County Emergency Management has been limited to expanding the warning system and developing evacuation procedures for those persons in areas that may flood. This includes road closings and rerouting of traffic to keep people out of the danger areas.

Drought

There are basically two types of drought in Wisconsin, agricultural and hydrologic. Agricultural drought is a dry period of sufficient length and intensity that markedly reduces crop yields. Hydrologic drought is a dry period of sufficient length and intensity to affect lake and stream levels and the height of the groundwater table.

These two types of drought may, but do not necessarily, occur together. It is possible to have an agricultural drought short in duration so that hydrologic factors are not significantly affected, even though crop failures occur. On the other hand, it is also possible to obtain reasonable crop yields during a long dry period that affects hydrologic factors, if the rainfall during the growing season is well timed, and sufficient to prevent severe stress on the crops.

Droughts (both agricultural and hydrologic) are rather common in Wisconsin. In fact, using annual precipitation as an indicator, it is fairly common to have very dry periods or drought, at any given time in one or more areas of the state. Even statewide, drought is not a rare event.

Unfortunately, there is little in the climatic record that can be used for predictive purposes.

WAUKESHA COUNTY OCCURRENCES

Date	Location	Description
1976	County Wide	Much crop damage
1983	SW of County	Slight crop damage
1984	West & South	Severe damage-USDA Declaration
1986	West & South	Severe damage-USDA Declaration
1988	County Wide	Severe damage-USDA Declaration

Waukesha County Parks and Land Use Department has the primary responsibility for establishing specific guidelines on well depth. To mitigate the effect of hydrologic drought the following actions can be taken: identification of areas with potential ground water level problems and inspection of wells in those areas for adequate depth and construction. Some Waukesha County communities have also adopted water usage regulations during drought conditions.

Waukesha County farmers may contact the Waukesha County UW-Extension Office and/or the USDA-Community Farm Services Office for information and guidance related to drought. Various federal and state publications are available from these agencies on ground water movement, the hydrologic cycle and irrigation methods. These agencies will also be the lead agencies in obtaining emergency food and water supplies for agricultural use.

In summary, drought is a part of Wisconsin's climatic history, occurring at irregular intervals in

Waukesha County. Since severe droughts have occurred and can be expected to occur again, contingency plans should be prepared in order to minimize the effects of drought, when it does occur.

Earthquakes

An earthquake is a shaking or trembling, sometimes violent movement of the earth's surface that follows a release of energy in the earth's crust. Earthquakes are unpredictable and strike without warning. They may range in intensity from slight tremors to great shocks and may last from a few seconds to as long as five minutes. They can come as a series of tremors over a period of several days.

The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Most casualties result from falling objects and debris because the shocks can shake, damage, or demolish buildings and other structures. The disruption of communications, along with electrical power lines, and gas, sewer, or water mains can be expected.

The earthquake threat to Waukesha County as a whole is not great. Ground shaking has been felt from earthquakes centered in Wisconsin, as well as those centered in adjacent states. In fact, the most recent earthquakes to be felt in this area at 1:12 p.m. and 1:16 p.m. on February 12, 1987, were actually centered in adjoining states.

Appendix D shows the locations and dates of the 24 recorded earthquakes which have occurred in Wisconsin since the turn of the century, none of which has caused substantial damage. Most of these quakes are poorly understood and are thought to result from the still-occurring rebound of crust caused by the retreat of glacial ice that pushed the crust down. Contrast this with California earthquakes which originate from the release of stress with the movement of tectonic plates.

Earthquakes are measured by two principal methods; seismographs (sophisticated seismic monitoring equipment) and human judgement. The Richter Scale (expressed in Arabic numbers) reports total energy released. The Mercalli is an intensity scale (expressed in Roman numerals) which reports damage or amount of shaking. As indicated above, most of Wisconsin's occurrences were not severe, with only two of the quakes measured by seismographs, with the greater of them registering at 5.1 on the Richter Scale. The maximum intensity for a Wisconsin quake on the Mercalli Scale is VII.

In recent years, considerable attention has been focused on seismic activity in the Midwest and in particular, on activity along the New Madrid Fault in Missouri. A severe earthquake occurred there in 1811 and the area has since that time continued to be seismically active. However, because no severe earthquakes have occurred in this fault zone since 1895, many people in the Midwest are unaware of the damage potential.

Studies on seismic activity in the New Madrid Fault Zone are significant to Wisconsin in that there is the potential for counties in southeastern Wisconsin to incur damage if there were a recurrence of the 1811 event.

A disruption of electrical power or gas and oil service in winter would cause a major emergency.

While the earthquake threat to Wisconsin as a whole is not great, it is imperative that local officials be aware of any potential threat for their particular area. Once that determination has been made, then appropriate response plans can be developed for minor, moderate or major impacts of a quake. If necessary, building codes and safe land use practices should be established and enforced. Also, existing structures, particularly public buildings used by large numbers of people, should be inspected to ascertain whether they can be made "earthquake safe".

Fires and Explosions

Fire is an ever present hazard in the County which can impact our homes, forests and major structures.

Structural fires typically involve buildings that have more than three floors and are designed for multiple businesses or resident occupancy. Usually these fires occur in large urban areas. The consequences can be severe with loss of property, income and in some cases, lives. These fires impact large numbers of people and require special planning and response efforts.

Typically, there are several large structural fires per year county-wide.

An explosion is a sudden release of a large amount of energy accompanied by shock and pressure waves. A very rapid fire can also be an explosion. For example, when gasoline is mixed with air in the proper proportions and ignited, the burning is extremely rapid, causing expansion of heated products and combustion that creates shock waves.

The threat of an explosion exists on a daily basis in Waukesha County. Large volumes of explosive material are stored, transported and used on a routine basis by both business and private sector consumers. When explosive material is mishandled or involved in an accident, the results can be disastrous. In a worst case scenario, incidents involving explosive materials could involve hundreds of Waukesha County residents.

Waukesha County has 30 well equipped fire departments with over 1500 trained fire fighters. Pre-fire response plans have been developed for many major structures and industries. Fire inspections and prevention activities are emphasized by all departments.

Flooding

Flood related hazards in Wisconsin arise from a complex set of hydrologic and hydraulic interactions. The hazards that result from these interactions include riverine flooding, coastal flooding and erosion, bank slumping, inland lake flooding, flash flooding, flooding from levee and dam failure, storm water runoff and ponding, and stream flooding.

The effects of flooding are devastating. Although the probability of serious injury and loss of life is low, personal property damage is usually heavy due to long periods of inundation. Also, the probability of long term health hazards (e.g., communicable diseases, epidemics, insect and rodent infestation, etc.) exists. Long-term damage to the environment may also occur.

Major floods in Wisconsin tend to occur either in spring when melting snow adds to normal runoff or in summer or early fall after intense rainfalls. Flooding which occurs in the spring due to snow melt and/or a prolonged period of heavy rain is characterized by a slow build-up of flow and velocity in rivers and streams over a period of days. This build-up continues until the river or stream overflows its banks, for as long as a week or two and then slowly recedes inch by inch. The timing and location of this type of flooding is fairly predictable and allows ample time for evacuation of people and property.

Flash flooding, which usually results from surface runoff after intense rains, also poses a threat to all areas of Wisconsin. It is a dangerous form of flooding because it is not very predictable. It can occur very quickly, precluding evacuation to higher ground to prevent loss of life. Small and normally calm streams will rise very rapidly when surrounding soil and terrain are unable to accommodate intense precipitation.

Generally, the amount of damage from flooding is a direct consequence of land use. If the ground is already saturated, stripped of vegetation, or paved, the amount of run-off increases, adding to the flooding.

The DNR, working with local governments, is identifying special flood hazard areas in the State. Such areas have a 1% chance of the computed flood occurring or being exceeded in any given year.

Four Presidential Disaster Declarations were received for flash flooding which occurred in August 1986 in Milwaukee and Waukesha Counties; September 1986 in Milwaukee, Waukesha, Ozaukee, Sheboygan, Manitowoc, Dodge, Kenosha and Washington Counties; June 1997 in Milwaukee, Waukesha, Ozaukee, and Washington Counties; and August 1998 in Milwaukee, Waukesha, Rock, and Sheboygan Counties. These floods revealed that no flood plains or urban areas in Wisconsin can be considered safe from flood damages.

Waukesha County is divided into two distinct drainage basins. The western portion of the County is drained into the Rock River Basin. Principal rivers in this area include the Oconomowoc River, Mason Creek and the Bark River. The eastern portion of County is drained

by the Fox River Basin.

There are numerous lakes in the County, the principal ones being Muskego Lake in the southeastern part, and a large group of lakes in the northwestern part between the Village of Pewaukee and the City of Oconomowoc.

There are numerous dams within Waukesha County. Most were built for recreational purposes. The chain of lakes on the Oconomowoc River, the Nemahbin Lakes and Nagawicka Lake on the Bark River, Phantom Lake on the Mukwonago River and Saylesville Pond on Genesee Creek all provide substantial attenuation of peak discharges on the watercourses where they are located.

Most other lakes provide little or no attenuation of the peaks and, therefore, provide little in the way of flood protection.

For the flooding sources studied in detail in Waukesha County, standard hydrologic and hydraulic methods were used to determine the flood hazard data required. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10, 50, 100, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management. These events, commonly termed the 10, 50, 100 and 500-year floods, have a 10, 2, 1 and 0.2 per cent chance respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered.

Waukesha County, historically has not had a serious flooding problem. However, there have been 7 major floods. In addition, there has been some localized flooding primarily caused by heavy rainfall and run-off.

WAUKESHA COUNTY OCCURRENCES

Date	Location	Description
1947	County wide	Spring snow melt
1948	County wide	Spring snow melt
1960	County wide	Spring snow melt & rains
1973	County wide	Heavy rains
1986	NW & NE	Heavy rains
1997	NE & SE	Heavy rains
1998	NE & SE	Heavy rains

There are many actions which can be taken to lessen the effects of flooding. Those that first

come to mind are the ones which can be called short-term, i.e., those actions which are taken immediately when an imminent threat exists. Examples are: issuance of early warnings through flood advisory bulletins, dissemination of instructions to the public through the media, preparation of congregate care facilities and evacuation of people and property. Short-term actions also include temporary protective measures such as sandbagging, build-up of levees, protection of buildings and other structures, and cut off of gas and electricity.

The current emphasis in flood mitigation, however, is in terms of long-range actions which can be taken. At one time, the trend was toward structural flood control, i.e., the building of dikes, dams, and levees, which was found to be costly and sometimes not as effective as other long-range actions. The trend now is toward a balanced approach combining structural control with flood plain management. This concept includes the adoption of proper flood plain zoning and storm water management ordinances, land use planning, acquisition and demolition of flood prone properties, and promotion of the sale of flood insurance. It has been shown that flood plain management reduces the cost of damages attributed to flooding. Information about Wisconsin Emergency Management's flood mitigation programs can be found at http://badger.state.wi.us/agencies/dma/wem/mit_home.htm.

Waukesha County adopted a Shoreland and Floodland Protection Ordinance on June 23, 1970. This Ordinance follows a strict interpretation of the guidelines set by the Federal Emergency Management Agency in that the County does not allow any construction in the floodplain.

Citizens, homeowners and renters can obtain flood insurance from any licensed property or casualty insurance agent. Both structural and content coverage may be obtained at an affordable rate for residential, commercial, industrial, agricultural and public buildings.

Hazardous Materials Incidents

As defined in Wisconsin Statute 144.03 (10), "Hazardous substance (material)" means any substance or combination of substances, including wastes, of a solid, liquid, gaseous or semi-solid form which, because of its quantity, concentration or physical, chemical or infectious characteristics, may cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness, or pose a substantial present or potential hazard to human health or the environment. Such substances may include, but are not limited to, those which are toxic, corrosive, flammable, irritants, strong sensitizers or explosive.

As a result of the demand for chemicals on the farm, in the home and in industry, all modes of transportation (highway, railroad and airlines) are carrying thousands of hazardous materials shipments on a daily basis through Wisconsin communities. Waukesha County has an extensive transportation system. The highway includes interstate highways, state, county and local roads. Common carrier truck lines, railroads and an air transportation network provide freight service. Petroleum products and hazardous materials are transported across the county at various times. A transportation accident involving any one of the above hazardous materials could cause a local emergency which could affect large numbers of people.

Major accidents can also occur at fixed sites like manufacturing plants, or any commercial establishment that uses, stores, produces, or treats hazardous materials.

In the case of either a transportation or fixed facility incident, the potential impacts are numerous. They include short and long-term health hazards to those exposed to the hazardous material, explosions, major fires and massive environmental contamination. The incident may necessitate short or long-term evacuation, which in turn disrupts the social and economic well-being of the affected area.

There are no areas of the State which are immune from hazardous materials incidents or accidents. However, there are several factors which must be considered when attempting to identify the scope, magnitude and vulnerability for incidents within specific areas of the State. One visible factor is the condition of the facility or transportation mode which handles hazardous materials. Other factors include the toxicity of the material and the potential for harm to the public health. In addition, the sophistication of on-site and off-site planning, as well as local response capabilities, must also be considered.

There are over 150 fixed facilities, including industrial and agricultural sites possessing extremely hazardous substances. There are over 300 locations reporting hazardous chemicals on their annual SARA Tier Two Chemical Inventory Report. Nearly 250 different hazardous substances are being reported. In addition, there are several farms in the County using and storing hazardous substances such as insecticides, herbicides and fertilizers.

While Waukesha County has had a strong record of safety and care in handling hazardous substances, there have been many oil, gasoline, pesticide, acid and other forms of toxic material

spills at fixed facilities, farms, roadways and in the water ways. As the county's industrial base continues to expand and population increases, the County's vulnerability to a hazmat incident is growing daily.

To address the hazmat concern, the County Local Emergency Planning Committee has developed off-site plans for all the fixed facilities which have extremely hazardous substances. In addition, four Level B Hazardous Materials Teams are available to respond to an incident in the County.

The State of Wisconsin has established a network of regional Level A hazardous materials teams which will be called upon to mitigate the most serious incidents. The City of Milwaukee Fire Department provides Level A services to Waukesha County.

Heat Waves

A heat wave is primarily a public health concern. During extended periods of very high temperatures or high temperatures and high humidity, individuals can suffer a variety of ailments including heat exhaustion and heat stroke. Heat stroke in particular is a life-threatening condition that requires immediate medical attention. In addition to posing a public health hazard, periods of excessive heat usually result in high electrical consumption for air conditioning, which can cause power outages and brown outs.

Excessive heat has become the most deadly hazard in Wisconsin. According to the National Weather Service, 111 people have died in Wisconsin directly as a result of heat waves during the 21 years from 1982-2002. This rate of mortality during this 21-year period is more than 4 times greater than the next most deadly hazard--tornadoes (25 deaths) and cold waves (24 deaths). Most deaths during a heat wave are the result of heat stroke. Large and highly urbanized cities can create an island of heat that can raise the temperature 3 to 5 degrees F. Therefore, urban communities with substantial populations of elderly, disabled and debilitated people could face a significant medical emergency during an extended period of excessive heat.

Several heat waves from mid-July through early August 2001 and claimed 15 fatalities (10 direct and 5 indirect) across Wisconsin. The next most recent heat wave occurred in Wisconsin during the last two weeks of July 1999 and peaked during the 4 days of July 28-31, 1999. During these four days, high humidity and temperatures in the 90s and 100s produced heat index values of 110 to as high as 125 degrees. The heat wave resulted in 12 direct and 8 indirect deaths (National Weather Service). During this time, there was record peak daily electric power demand in the Milwaukee area and for that summer there was a record set for the Midwest region for electrical demand.

During the summer of 1995, Wisconsin experienced 2 periods of prolonged heat. From June 17-27, high temperatures were well in the 90s with heat index values of 98 to 104. During this period, 9 people died directly or indirectly from the heat. The second heat wave, July 12-15, resulted in the greatest number of weather-related deaths in Wisconsin history. During this heat wave, 141 people died directly or indirectly from the heat. High temperatures were between 100 and 108 with heat index values of 120 to 130.

The National Weather Service (NWS) issues advisory statements to media, emergency management and public health officials in advance of and during conditions of excessive heat. Heat waves cannot be prevented; therefore, it is important to provide notice of adverse conditions so that the public can anticipate and avoid health-threatening situations.

The Milwaukee-Sullivan office of the National Weather Service offers the following 5 types of alerts for excessive heat conditions in its 30-county service area:

1. **Outlook** – A narrative statement issued 2 to 4 days prior to the first day that excessive heat conditions are anticipated to notify that the potential exists for a heat wave;

2. **Heat Watch** – A Heat Watch is issued 24-48 hours in advance when heat advisory conditions are expected.
3. **Excessive Heat Watch** – An Excessive Heat Watch is issued 24 to 48 hours in advance when Excessive Heat Warning conditions are expected. Vulnerable populations should take precautions to protect their health to prevent heat strokes and other health related illnesses. Agency action plans should be in place should the watch be upgraded to a warning.
4. **Heat Advisory** – A Heat Advisory is issued 6-24 hours in advance of any 24-hour period in which daytime heat indices (HI) are expected to be 105-110 for 3 hours or more and night time HI's are at least 75. Advisories are issued for less serious conditions that cause significant inconvenience and, if caution is not exercised, could lead to life threatening situations.
5. **Excessive Heat Warning** – An Excessive Heat Warning is issued 6-24 hours in advance of any 24-hour period in which daytime heat indices (HI) are expected to exceed 110 for 3 hours or more and night time HI's are at least 80 or greater. Warnings are issued for life threatening conditions. Heat stroke/sunstroke is highly likely with continued exposure. Elderly, sick, socially disadvantaged and medicated individuals are at a higher risk and may die, especially if they live in poorly ventilated areas.

Heat Wave Safety Tips: The following safety tips can minimize the possibility of getting a heat related disorder.

Slow down. Strenuous activities should be reduced, eliminated, or rescheduled to the coolest time of the day. Individuals at risk should stay in the coolest available place, not necessarily indoors.

Dress for summer. Lightweight, light-colored clothing reflects heat and sunlight, and helps your body maintain normal temperatures.

Put less fuel on your inner fires. Foods (like proteins) that increase metabolic heat production also increase water loss.

Drink plenty of water or other nonalcoholic fluids. Your body needs water to keep cool. Drink plenty of fluids even if you don't feel thirsty. Persons who (1) have epilepsy or heart, kidney, or liver disease, (2) are on fluid restrictive diets, or (3) have a problem with fluid retention should consult a physician before increasing their consumption of fluids.

Do not drink alcoholic beverages.

Do not take salt tablets unless specified by a physician. Persons on salt restrictive diets should consult a physician before increasing their salt intake.

Spend more time in air-conditioned places. Air conditioning in homes and other buildings markedly reduces danger from the heat. If you cannot afford an air conditioner, spending some time each day (during hot weather) in an air-conditioned environment affords some protection.

Don't get too much sun. Sunburn makes the job of heat dissipation that much more difficult.

See the table on the following page for treating heat related disorders.

Treating Heat Related Disorders

Heat Disorder	Symptoms	First Aid
Sunburn	Redness and pain. In severe cases, swelling of skin, blisters, fever, headaches.	Ointment for mild cases if blisters appear. If breaking occurs, apply dry sterile dressing. Serious, extensive cases should be seen by a physician.
Heat Cramps	Painful spasms usually in muscles of legs and abdomen possible. Heavy sweating.	Firm pressure on cramping muscles, or gentle massage to relieve spasm. Give sips of water. If nausea occurs, discontinue.
Heat Exhaustion	Heavy sweating, weakness, skin cold, pale and clammy. Weak pulse. Normal temperature possible. Fainting and vomiting.	Get victim out of sun. Lay down and loosen clothing. Apply cool wet cloths. Fan or move victim to air conditioned room. Give sips of water. If nausea occurs, discontinue. If vomiting continues, seek immediate medical attention.
Heat Stroke (or sunstroke)	High body temperature (106°F or higher). Hot dry skin. Rapid, strong pulse. Possible unconsciousness. Victim will likely not sweat.	Heat stroke is a severe medical emergency. Summon medical assistance or get the victim to a hospital immediately. Delay can be fatal. Move the victim to a cooler environment. Reduce body temperature with cold bath or sponging. Use extreme caution. Remove clothing, use fans and air conditioners. If temperature rises again, repeat process. Do not give fluids.

Terrorism

Terrorism can be defined as the unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population or any segment of either, in the furthering of political or social objectives. The Federal Bureau of Investigation categorizes two types of terrorism in the United States: *domestic terrorism* which involves groups or individuals whose activities are directed at elements of our government or population without foreign direction; and *international terrorism* which involves groups or individuals who are foreign based and/or directed by countries or groups outside the U.S. or whose activities transcend national boundaries. Additionally, some acts conducted by gangs, people involved in civil unrest, radical splinter groups or activists and people involved in illegal drug trade could also be described as terrorism.

An act of terrorism can take several forms, depending on the technological means available to the terrorist, the nature of the political issue motivating the act and the points of weakness of the terrorism target. Among the terrorist action possibilities are:

Bombing: Most terrorist incidents in the U.S. have involved bombs or incendiary devices, including detonated and undetonated explosive devices, tear gas, pipe and fire bombs and rocket attacks. Often the capacity existed for large-scale damage and/or mass casualties. An example of this would be the bombing of the Federal Building in Oklahoma City in August 1995. The type of materials and method of delivery utilized in the bombing of the Murrah Federal Building are readily accessible to potential terrorists. Because of the ready availability of such materials, the potential for mass damage and casualties and experiences to date in the nation, it is anticipated that of the various types of WMD weapons, explosive weapons have a high potential for use in the U.S.

Airline Attack: Despite efforts to improve airline security in the U.S. after the 9/11/01 attacks on the World Trade Center in New York, some note that airport security still falls short of acceptable and necessary standards. In addition to hijacked planes crashing into buildings, incidents could include airplane bombings, sabotage or hijacking, airport bombings or shootings or the tampering with air navigation and control systems, resulting in plane crashes or collisions.

Chemical/Biological/Nuclear: Terrorists can use chemical and biological agents or weapons to either extort or deliberately try to kill in order to further political goals. Toxins such as anthrax or even some radiological materials could become credible threats. From October-December 2001, there were nearly 100 anthrax hoaxes in Waukesha County. Although these threats and letters proved to be hoaxes, first responders cannot afford to treat these types of cases lightly.

Hostage Taking: The taking of hostages can provide terrorist groups publicity for their political or social objectives, allow negotiation for furtherance of their aims or result in events which are designed to invoke sympathy for their causes. The main goal of response agencies is to end the incident, with the absolute minimum loss of innocent lives as possible. The common belief that most response agencies are willing to agree to any demand to prevent endangering the safety of

hostages is not a true statement in all cases.

Infrastructure Attack: An individual or group of terrorists could coordinate an attack against utilities and other public services such as the water supply, electric power generation and transmission or telephone service. Another form of infrastructure attack is against computer resources such as networks, databanks and software by infiltrating computer networks and altering, stealing or destroying programs and data. As society becomes more dependent on computers, this form of cyber-terrorism is a legitimate concern.

The emergency management community in the United States must accept that national security and intelligence organizations may not always be successful in preventing terrorist incidents. It is up to state and local emergency management personnel and services to respond when these attacks occur. The ramifications of responding to a terrorist incident may not be the same as traditional large-scale emergencies. The safety of emergency service providers must be an early, primary consideration. Federal and state government agencies depend directly on local managers and emergency response personnel and their initial and follow-on actions during any terrorist incident.

When dealing with terrorist incidents, the traditional command structure may need to be adjusted due to the inclusion of additional federal and state agencies. These additional required personnel should be identified prior to the situation arising. The conventional procedure of treating the injured at the scene may threaten the life of the patient and emergency personnel, thus requiring the rapid evacuation of the injured from the scene before treatment begins. In addition, mass decontamination may be needed for chemical, biological or nuclear attacks.

Waukesha County has developed a Terrorism Consequence Management Annex and a Bioterrorism Response Plan and added both to the existing Emergency Operations Plan.

As part of that process, potential targets, as well as threat and risk potentials were identified. Potential terrorist targets include government facilities, utilities, commercial and educational facilities and transportation systems. It is safe to assume that any type of facility on which a terrorist attack could generate desired publicity or further terrorism objectives could be classified as a potential target.

Numerous first responders have gone to WMD awareness and response training. Waukesha County was one of the first counties in the country to conduct an exercise that integrated civilian and military assets for response to a biological incident.

The County has utilized federal funds to purchase domestic preparedness equipment for its first responders and hazardous materials teams which will enhance local response capabilities.

Thunderstorm Hazards

Thunderstorms and their associated hazards, lightning, hail and tornadoes, can occur throughout the County during any month of the year and with little or no notice. Because of their rather spontaneous development and short lives, little can be directly observed of these phenomena other than the path of destruction that is left behind.

Due to their unique characteristics, thunderstorms and their associated hazards will be discussed individually.

Thunderstorms

A thunderstorm is a severe local storm produced when a relatively shallow layer of warm moist air is overrun by a deep layer of dry cool air. Cumulonimbus clouds, called thunderheads, are formed. This towering mass may be six miles or more across and 40,000 to 50,000 feet high. It may contain 1-1/2 million tons of water and enormous amounts of energy that often are released in the form of high winds, excessive rains, and three violently destructive natural elements -- lightning, tornadoes and hail.

On the ground directly beneath the storm system, the mature thunderstorm is initially felt as rain, which is soon joined by a strong downdraft. The downdraft spreads out from the cloud in gusting divergent winds, and brings a marked drop in temperature. Even where the rain has not reached the ground, the thunderstorm's mature stage can be recognized by this cold air stream flowing over the surface. This is nature's warning that the thunderstorm is in its most violent phase.

A thunderstorm often lasts no more than 30 minutes. The individual thunderstorm cell travels frequently between 30 and 50 miles per hour. Strong frontal systems, though, may spawn one squall line after another composed of many individual thunderstorm cells. These fronts can often be tracked completely across the State from west to east.

Thunderstorm frequency is measured in terms of incidents of thunderstorm days--days on which thunderstorms are observed. Wisconsin averages between 30 and 50 thunderstorm days per year depending on location. In Waukesha County, there are typically ten severe thunderstorms per year. Thunderstorms can occur throughout the year although their highest frequency is during the months of May through September. They occur most often between the hours of noon and 10:00 p.m.

Severe thunderstorms can cause injury or death and result in substantial property damage. They may cause power outages and disrupt telephone service and seriously tax the emergency management capabilities of the affected jurisdictions.

Lightning

Lightning is a secondary effect of electrification within a thunderstorm cloud system. As a thunderstorm induces the growing positive charge on the ground, the negative charges in the cloud become great enough to overcome the resistance of insulating air and forces a conductive path for current to flow between the two charges. Lightning strokes represent a flow of current and may proceed from cloud to cloud, cloud to ground, or where high structures are involved, from ground to cloud.

The sudden and violent discharge which occurs in the form of a lightning stroke is over in a millionth of a second. The temperatures in the lightning stroke channel rise to 50,000 degrees Fahrenheit producing a bright flash of light in a loud clap of thunder caused by the sudden expansion of air.

Lightning damage results from four effects of the lightning stroke: electrocution of humans and animals; vaporization of materials along the path of the stroke; fire caused by the high temperature produced by the stroke; and a sudden power surge that can damage electrical and electronic equipment. In the United States, lightning kills more people each year on the average than either hurricanes or tornadoes.

Wisconsin has a high frequency of property losses due to lightning. Insurance records, for instance, show that two out of every 100 farms are struck by lightning or have a fire which may have been lightning-caused each year. Rural areas and small towns tend to experience more lightning caused deaths and injuries than large cities. During the period of 1982-2002, Wisconsin recorded 19 deaths as a result of lightning.

Large outdoor gatherings (sporting events, concerts, campgrounds, etc.) are particularly vulnerable to lightning strikes that could result in injuries and deaths. This vulnerability underscores the importance of developing site-specific emergency procedures for these types of events, with particular emphasis on adequate early warning. Early warning of lightning hazards, combined with prudent protective actions, can greatly reduce the likelihood of lightning-related injuries and deaths.

Preventing Deaths and Injuries from Lightning Strikes

- When participating in outdoor activities, be aware of weather forecasts during the thunderstorm season (generally May through September).
- Because lightning often precedes rain, preparations to avoid potential lightning strikes should begin before the rain begins.
- When thunder is heard, seek shelter inside the nearest building or an enclosed vehicle (e.g., a car or truck). If shelter is not available, avoid trees or tall objects because electricity may be conducted from that object to other nearby objects or persons.
- Avoid high ground, water, open spaces and metal objects (golf clubs, umbrellas, fences and tools).
- When indoors, turn off appliances and electronic devices and remain inside until the storm passes.

Hail

Hail is atmospheric water particles from thunderstorms in the form of rounded or irregular lumps of ice called hailstones. These stones range from the size of a pea to the size of a grapefruit and form when sub-freezing temperatures cause water in thunderstorm clouds to accumulate in layers around an icy core. When strong underlying winds can no longer support the added weight, the hailstones fall earthward, battering crops, denting autos, breaking windows and damaging roofs. Injury and loss of human life are rarely associated with hail storms.

Hail tends to fall in swaths which may be from 20 to 115 miles long and 5 to 30 miles wide. A hail swath is not a large continuous path of hail but generally consists of a series of hail strikes which are produced by individual thunderstorm clouds traversing the same general area. Hail strikes are typically one-half mile wide and five miles long. They may partially overlap, but often they leave completely undamaged gaps between them.

Wisconsin averages between two and three hail days per year as recorded at National Weather Service stations. This may not be indicative of the number of hail storms which occur within a county or larger area during any given hail season.

The months of maximum hail storm frequency are May through September with approximately 85 percent of hail storms occurring during this period. Most of the hail damage is in the rural areas as these five months also correspond to the growing and harvesting seasons for most crops.

The county extension agent distributes information on various hail insurance options. In the event of major damage, the Waukesha County Emergency Board, comprised of county and federal agricultural agency representatives, will have primary responsibility for documenting hail damage.

Federal emergency assistance is available in the form of low-interest loans when a Presidential Disaster is declared or when FEMA declares a county eligible for aid. Damage from hailstorms alone is generally not extensive enough to invoke a disaster declaration.

Tornadoes and Downbursts

The tornado is a violently rotating column of air, extending from a thunderstorm cloud system. It is nearly always visible as a funnel, although its lower end does not always touch the ground. Average winds in the tornado, although never accurately measured, are probably between 100 and 200 miles per hour. Tornadoes may produce winds exceeding 300 miles per hour.

A tornado path averages four miles, but may reach up to 300 miles in length. Widths average 300-400 yards, but tornadoes have cut swaths a mile or more in width, with severe tornadoes or groups of two or three funnels traveling together. On the average, tornadoes move between 25 and 45 miles per hour, but speeds up to 70 m.p.h. have been reported. Tornadoes rarely last more than a couple of minutes over a spot or more than 15-20 minutes in a ten mile area.

The destructive power of the tornado lies primarily in its high wind velocities and sudden changes in pressure. Wind and pressure differentials probably account for 90 percent of tornado-caused damage. Since tornadoes are generally associated with storm systems, they usually are accompanied by hail, torrential rain and intense lightning. Depending on their intensity, tornadoes can uproot trees, down power lines and destroy buildings. Flying debris can cause serious injury or even death.

Downbursts are characterized by straight line winds. Downburst damage is often highly localized and resembles that of tornadoes.

There are significant interactions between tornadoes and downbursts, and the path of a tornado can be affected by downbursts, resulting in a right, left or even a U-turn. High winds in July, 1991, caused extensive county-wide damage for which a Presidential Major Disaster Declaration was received.

While all Wisconsin counties have recorded at least one tornado in the period from 1950-2000, Waukesha County has recorded 34 tornadoes. For the past few years, Wisconsin has ranked about fifteenth in the nation insofar as number of tornado occurrences.

Tornadoes most frequently occur in the late afternoon and early evening, but can occur at any time. As many as 75 percent of all Wisconsin tornadoes occur between the hours of 3:00 p.m. and 7:00 p.m.

Tornadoes display a strong seasonal variation. In Wisconsin, they have occurred in every month except February, with most activity occurring between April and September. The month of June has the highest tornado frequency. The most severe tornadoes occur during April, May and June with tornadoes during the remainder of the year as a rule being smaller and with shorter tracks. Winter, spring and fall tornadoes are more likely to occur in southern Wisconsin than in northern counties.

Preparedness Activities

An effective warning system is the single most important source to alert the public to a severe weather hazard.

In the event of a severe weather threat, the National Weather Service issues weather bulletins, watches and warnings. These are disseminated over a number of telecommunication channels including NOAA weather radio, the NOAA weather wire and the state law enforcement TIME System. These systems are routinely monitored by local media which rebroadcast the information over television and radio stations.

During the past years, there has been a statewide Tornado Awareness Week in late March or April. The Waukesha County Emergency Management Office actively promotes tornado safety

public information as well as other summer severe weather public awareness educational efforts. It also assists the National Weather Service in sponsoring tornado spotter training and organizing local tornado spotter networks. In addition, the Office assists personnel in schools and businesses, public facility managers and individuals in determining "best available" tornado safety areas.

Transportation Accidents: Aircraft, Rail, Highway

Transportation accidents pose a hazard for emergency responders from a number of perspectives. With rail and air accidents especially, emergency response personnel may confront problems like fires, rescue and emergency first aid for survivors, inadequate medical or mortuary facilities for victims, crash site security (crowd and traffic control) and the presence of hazardous materials. In all cases, human health and safety and the environment are in jeopardy.

Aircraft

Airports present real challenges for emergency planners. Besides the entire spectrum of natural disasters which can disrupt normal operations, airports must have emergency response plans for airplane crashes/accidents and bomb incidents. Waukesha County operates Crites Field. The County also lies in the flight path to General Mitchell International Airport in Milwaukee.

It is important to note that the risk of airplane crashes/accidents is greatest during landing and take off procedures. As a result, the developed areas adjacent to the airport and in the airport flight paths are highly vulnerable to this hazard. Over the last decade, there have been several fatalities involving accidents from small recreational aircraft in the County.

Rail and Highway

Wisconsin's railroad system is following a national trend of decreasing in physical size. Presently there are 3 railroads operating in the County. These include Amtrak, Wisconsin Southern and the CP Rail System.

Passenger train accidents may involve mass casualties. For such occurrences, mutual aid will likely be necessary, as will the establishment of a field command post and staging area. Among other things, procedures will be required for implementing medical triage, and for tagging, identifying and transporting victims to medical facilities or temporary morgues.

When and where transportation accidents occur is determined by a number of variables, including volume of traffic, weather conditions, and condition of transporting vehicle, as well as the condition of the railroad tracks or highway. Even with ideal conditions of all types, transportation accidents can and do occur.

The likelihood that an incident will be complicated by the presence of hazardous materials is great. Highway-related incidents account for 83% of all transportation accidents involving hazardous materials. Gasoline accounts for 17 percent of the incidents; sulfuric acid, 11 percent; anhydrous ammonia, 5 percent; and caustic soda, hydrochloric acid, and LPG, 4 percent, respectively.

Of all hazardous substances, those most frequently involved in transportation incidents by all modes include paint and related products, batteries, gasoline, cleaning compounds and paint

removing compounds.

In rail transport, sulfuric acid, phosphoric acid, anhydrous ammonia, hydrochloric acid, corrosive liquids and flammable liquids are, in that order, the major chemicals involved.

Waukesha County emergency service agencies have local plans and response procedures for use in transportation accidents. Personnel from all police, fire and emergency medical services (EMS) have had training in handling these hazards.

Winter Storms

Winter storms include heavy snow storms, blizzards, freezing rain, sleet and ice storms. Cold temperatures and wind chills must also be considered among winter's perils.

A snowfall and accumulation of six or more inches in a 12-hour period is considered a heavy snowfall. The majority of Wisconsin snowfalls are between one and three inches per occurrence. However, heavy snowfalls which produce at least ten inches may occur three or four times per season.

A blizzard is defined as the occurrence of sustained wind speeds in excess of 35 miles per hour accompanied by heavy snow or large amounts of blowing or drifting snow. Northwestern Wisconsin encounters more blizzards than southeastern portions of the state.

An ice storm occurs when rain falls out of the warm and moist upper layers of the atmosphere into a cold and dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces. If a half inch of rain freezes on trees and utility wires, damage can occur, especially if accompanied by high winds.

A sleet storm differs from an ice storm in that sleet is actually frozen rain drops or pellets which do not cling to surfaces. An accumulation of the pellets can, however, make driving hazardous.

Both ice and sleet storms can occur at anytime throughout the winter season from November into April. Early and late season ice and sleet storms are generally restricted to northern Wisconsin. Otherwise, the majority of these storms occur in southern Wisconsin.

Winter storms present a serious threat to the health and safety of the affected citizens and can also result in damage to property, such as when the weight of heavy snow causes the structural collapse of buildings.

Generally, the winter storm season in Wisconsin runs from November to March. Severe winter weather has occurred, however, as early as October and as late as the latter half of April and into May in some locations in the State.

In December, 2000, Waukesha County along with surrounding counties received record snow falls. A Presidential Emergency Declaration was received and eligible applicants received federal and state funds for extraordinary expenses associated with clearing roads and emergency response efforts.

Communities prepare for severe winter weather by ensuring that plowing and sanding equipment is operational and available to handle potential emergencies.

Also, extra personnel and funding may be necessary to cover extensive overtime hours. Communication lines also need to be established between government, police, fire, EMS,

hospitals and highway departments. The Waukesha County Emergency Operations Plan provides for coordination of public safety, support agencies (such as the American Red Cross), and resource acquisition during emergencies.

Winter safety information is prepared and distributed to the media and public by the Waukesha County Emergency Management Office. In the event of severe winter weather, the National Weather Service issues advisories, watches and warnings to alert the public of situations that could pose a threat to life and property.

WAUKESHA COUNTY INTEGRATED EMERGENCY MANAGEMENT SYSTEM

It is the mission of the Waukesha County Office of Emergency Management to develop and implement a comprehensive and integrated emergency management program designed to mitigate, prepare for, respond to and recover from the effects of all hazards which impact the welfare, safety and health of all County citizens.

The Office has adapted an "**all-hazards**" approach to planning for potential threats to life and property. This comprehensive approach which is responsive to any major emergency consists of three interrelated components:

- 1) **All types of hazards:** The commonalities among all types of technological and natural disasters suggest strongly that many of the same management strategies can apply to all such emergencies.
- 2) **An emergency management partnership:** The burden of disaster management, and the resources for it, require a close working partnership among all levels of government (federal, state, county and local) and the private sector (business and industry, voluntary organizations, and the general public); and
- 3) **An emergency lifecycle:** Disasters do not just appear one day. Rather, they exist throughout time and have a lifecycle of occurrence which must be matched by a series of management phases that include strategies to mitigate hazards, prepare for and respond to emergencies and recover from their effects.

Mitigation refers to activities which actually eliminate or reduce the chance of occurrence or the effects of a disaster. Much can be done to either prevent major emergencies or disasters from ever happening, or if nothing else, at least reduce the damaging impact if they cannot be prevented. These include such things as zoning ordinances, building codes and enforcement, public health ordinances, fire regulations, hazardous materials training, dam inspections, and many others.

Mitigation efforts usually rest with the departments which deal with these hazards on a day-to-day basis. For example, the fire department is responsible for enforcing the fire regulations, and the building inspector is responsible for enforcing the local building codes. All these laws serve to mitigate hazards.

The next phase of emergency management is preparedness. **Preparedness** is planning how to respond in case an emergency or disaster occurs and working to increase resources available to respond effectively. Preparedness activities are designed to help save lives and minimize damage by preparing people to respond appropriately when an emergency is imminent. To respond properly, a jurisdiction must have a plan for response, trained personnel to respond and necessary resources with which to respond.

The County Emergency Operations Plan (EOP) serves as an overview of the County's approach to emergency management. It details the tasks to be carried out by specific organizations based on established objectives, assumptions and a realistic assessment of capabilities. It defines the relationship between the various functions and fixes the responsibility of who is to do what.

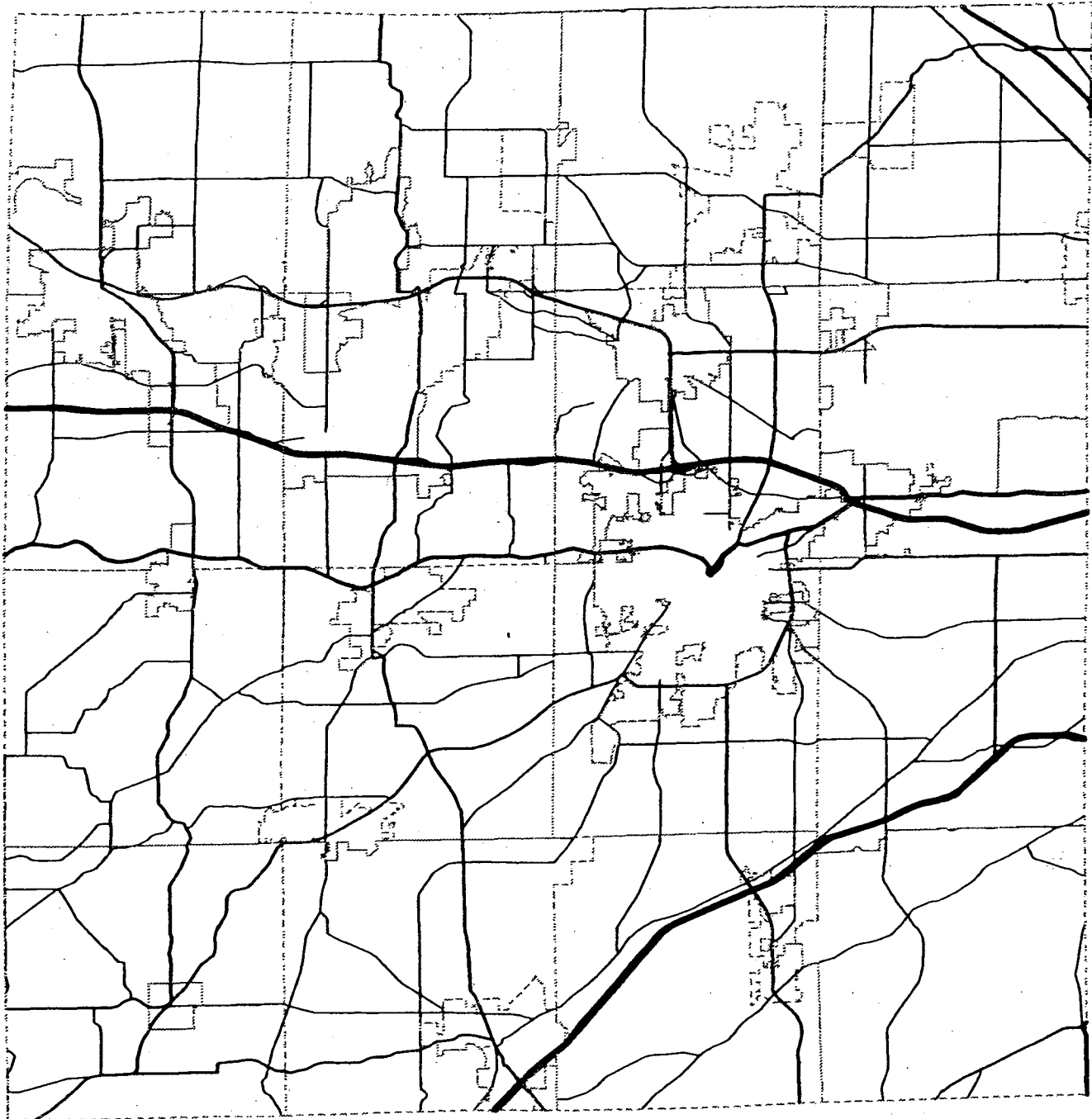
Response is the next phase of emergency management. Response activities occur during and immediately following a disaster. They are designed to provide emergency assistance to victims of the event and reduce the likelihood of secondary damage. Our fire departments, police departments, and emergency medical services are primary responders. Depending upon the type of emergency, the health department, public works, or human services agencies may also become part of the response.

Recovery is the final phase of the emergency management cycle. Recovery continues until all systems return to normal, or near normal. Short-term recovery returns vital life support systems to minimum operating standards. Long-term recovery from a disaster may go on for years until the entire disaster area is completely redeveloped, either as it was in the past or for entirely new purposes that are less disaster-prone.

Few communities can expect to recover from a major disaster without financial assistance from the state and federal governments. The most common reason for failure to obtain federal assistance is lack of adequate documentation. Every jurisdiction in Waukesha County must be prepared to assess the damage that has occurred in their community following a disaster.

The Waukesha County Office of Emergency Management has the responsibility for coordinating all the components of the emergency management system. These components consist of fire and police, emergency medical service, public works, health and human services, volunteers and other groups contributing to the management of emergencies. These parts of the emergency management system are no different then the parts of government and the private sector that manage the day-to-day affairs of the community. Emergency government is government in an emergency.

APPENDICES



Legend



Civil Division Boundary



Interstate Highway



STH



USH

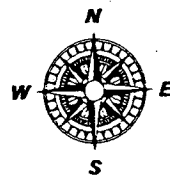


CTH

Hazardous Materials

Transportation

Routes



0 1 2 3 mi



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Waukesha County
Land Information Office

Waukesha County



ECONOMIC PROFILE

Waukesha County, WI

Population

Year	Number	Percent Change
1980	280,203	—
1990	304,715	8.7
1999 (est.)	350,273	15.0
2020*	391,500	11.8
2020**	460,000	31.3

*SEWRPC intermediate growth projections

**SEWRPC high growth projections

Source: U.S. Bureau of the Census, Wisconsin Department of Administration, and SEWRPC.

Housing

Year	Total Households	Percent Change
1980	88,552	—
1990	105,990	19.7
2020*	150,600	42.1
2020**	170,100	60.5

Unit Information: 1990

Total Units.....	110,452
Owner Occupied.....	81,927
Median Value.....	\$96,300
Renter Occupied.....	24,063
Median Rent.....	\$480
Vacancy Rate.....	5.4

Units Authorized by Building Permits: 1999

Total Units.....	2,549
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*SEWRPC intermediate growth projections

**SEWRPC high growth projections

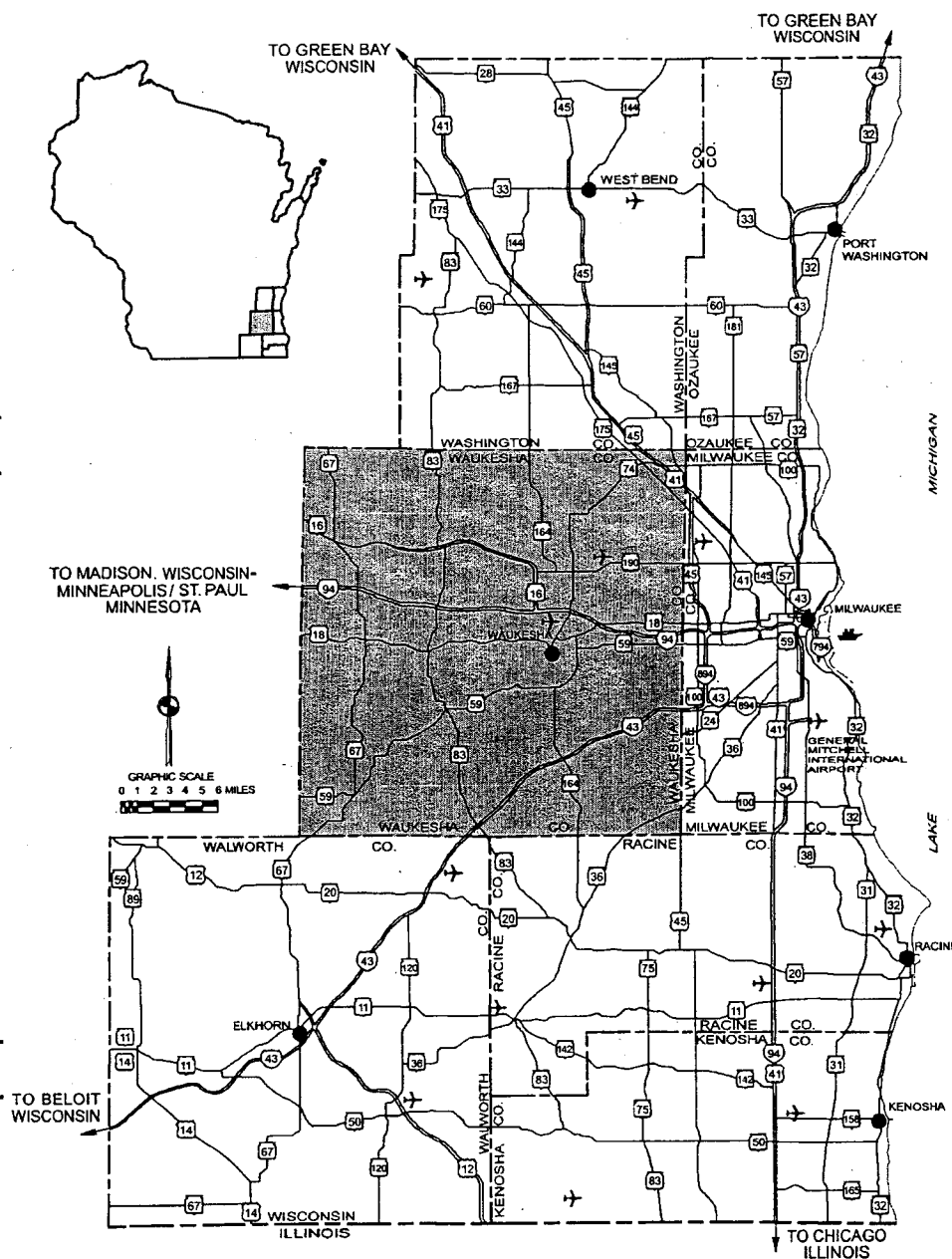
Source: U.S. Bureau of the Census and SEWRPC.

Income

1997 Per Capita Personal Income

Waukesha County.....	\$33,511
Southeastern Wisconsin Region	27,673
Wisconsin.....	24,048

Source: U.S. Bureau of Economic Analysis and SEWRPC.



Transportation

Highways

- Interstate Highways 43 and 94
- United States Highways 18 and 41
- State Trunk Highways 16, 59, 67, 83, 164, and 190

Trucking

- 203 trucking and warehousing establishments

Public Transportation

- Waukesha Metro Transit provides fixed-route local bus service within the City of Waukesha, to Waukesha County Technical College in the Village of Pewaukee, and to Brookfield Square Shopping center in the City of Brookfield
- Specialized transportation service provided by the Waukesha County Department of Aging to the elderly and persons with disabilities.

Railway Service

- Canadian Pacific Railway
- Wisconsin Central Transportation Corp.
- Wisconsin & Southern Railroad Company
- Union Pacific Railroad
- Municipality of East Troy Wisconsin Railroad

Water Transportation Facilities*

- Waukesha County is located 10 miles west of the Port of Milwaukee.
- Commuter-oriented bus services subsidized by the county provided between the Oconomowoc, Waukesha, Menomonee Falls, and Mukwonago Areas; and downtown Milwaukee
- Inter-city bus service provided in the Milwaukee to Madison travel corridor.

Air Service*

- Waukesha County-Crites Field, Waukesha
- Capitol Airport, Brookfield
- Aero Park Airport, Menomonee Falls
- Lawrence J. Timmman Field, Milwaukee County
- General Mitchell International Airport, located 15 miles southeast in the City of Milwaukee
- Chicago O'Hare International Airport is located 80 miles south

*All distances are measured from the nearest county line.

Labor and Wages

WAUKESHA COUNTY EMPLOYMENT: 1998 MONTHLY AVERAGE*

Employment by Industry	Number of Persons Employed	Percent of Persons Employed
Agriculture, Forestry, and Fishing	2,130	1.0
Construction.....	13,709	6.5
Manufacturing.....	55,087	25.9
Transportation and Public Utilities.....	8,409	4.0
Wholesale Trade.....	19,943	9.4
Retail Trade.....	32,883	15.5
Finance, Insurance, and Real Estate.....	11,999	5.6
Services.....	51,780	24.4
Public Administration.....	16,179	7.6
Unknown Industry Division.....	277	0.1
Total.....	212,396	100.0

MEDIAN HOURLY WAGES FOR SELECTED OCCUPATIONS: 1998

Occupational Category	Milwaukee MSA*
Administrative and Managerial Occupations.....	\$22.28
Professional, Paraprofessional, and Technical.....	14.67
Sales and Related Occupations.....	15.65
Clerical and Administrative Support Occupations..	11.21
Service Occupations.....	9.42
Agricultural, Forestry, Fishing, and Related Occupations.....	9.18
Production, Construction, Operating, Maintenance and Material Handling Occupations.....	13.48

*Wage rates are for Milwaukee, WI MSA, which includes Milwaukee, Ozaukee, Washington, and Waukesha Counties, and may vary in specific locations within the four-county area.

Source: Wisconsin Department of Workforce Development and SEWRPC.

PROJECTED EMPLOYMENT: 2005**

Employment by Industry	Number of Persons Employed	Percent of Persons Employed
Agriculture, Forestry, and Fishing.....	3,500	0.4
Construction.....	30,100	3.5
Manufacturing.....	158,700	18.2
Transportation and Communication.....	42,300	4.9
Trade.....	190,400	21.9
Finance, Insurance, and Real Estate.....	63,800	7.3
Services.....	288,200	33.1
Government.....	94,300	10.8
Total.....	871,300	100.0

*Not included: Self-employed, unpaid family workers, and private household workers.

**Projections to 2005 are for Milwaukee, Ozaukee, Washington, and Waukesha Counties.

Source: Wisconsin Department of Workforce Development and SEWRPC.

WAUKESHA COUNTY CIVILIAN LABOR FORCE: MARCH 1999

Total Civilian Labor Force.....	211,061
Employed Civilian Labor Force.....	205,872
Unemployed Civilian Labor Force.....	5,189

Source: Wisconsin Department of Workforce Development and SEWRPC.

Major Private-Sector Employers

MANUFACTURING

Machinery Except Electrical

Alto-Shaam, Inc.
Custom Products Corp.
Dorner Manufacturing Corp.
Guhring, Inc.
J & L Fiber Services, Inc.
Milwaukee Electric Tool Corp.
U.S. Filter/Envirex
Wacker Corp.
Wisconsin Lift Truck Corp.

Fabricated Metal Products

Alloy Products Corp.
Arcron, Ltd.
Bradley Corp.
The Brewer Company
Fleck Controls, Inc.
Maysteel Corp.

Printing and Publishing

Arandell Corp.
Inland Press
Kalmbach Publishing Company
Quad/Graphics, Inc.

Rubber and Miscellaneous Plastics Products

A & A Manufacturing Company, Inc.
Cooper Power Systems, Inc.
Dickten & Masch Manufacturing Company
Molded Rubber/Plastic Corp.
Seaquist Closures
Sussex Plastics, Inc.

Electrical and Electronic Equipment

Cooper Power Systems Division
Generac Corp.
General Signal Power Systems
Microelectronic Modules Corp.
Waukesha Electric Systems

Instruments and Related Products

Camtronics, Ltd.
G. E. Medical Systems
Quad/Tech, International
U.S. Controls Corp.

Food and Kindred Products

Beatrice Cheese Waukesha
Kraft Pizza
Lamplight Farms, Inc.
Oconomowoc Canning Company
Oconomowoc Packaging
Wis-Pak Foods, Inc.

SERVICES

Insurance Carriers

Allstate Insurance Companies
Northwestern National

Business

Fiserv, Inc.
Manpower, Inc. of Waukesha
Payco American Corp.
Programmed Cleaning, Inc.
United Parcel Service

Health

Community Memorial Hospital
Elmbrook Memorial Hospital
Family Health Plan
Laureate Group
Lutheran Homes of Oconomowoc
Medical Associates
Memorial Hospital
Rogers Memorial Hospital
Waukesha Hospital System, Inc.
Waukesha Memorial Hospital

Engineering, Research, and Management

Harnischfeger Engineers, Inc.

Education

Waukesha County is served by eleven K-12 school districts, one 9-12 district, and seven K-8 districts.

Public High School Graduates: 1999

Total Graduates.....4,305
Average Graduation Rate.....98%

Standardized Test Results: 1999

Based upon the mean scores reported in the nation, Wisconsin students scored highest on the American College Test (ACT) in the 1998-99 school year.

1998-99 Average ACT Scores

Waukesha County.....22.36
Wisconsin.....22.30
United States.....21.00

The following post-secondary educational facilities are located within Waukesha County:

Colleges and Universities

Carroll College, City of Waukesha
Ottawa University-Milwaukee,
City of Brookfield
University of Wisconsin-Waukesha,
City of Waukesha

Technical and Vocational Schools

Waukesha County Technical College,
Village of Pewaukee campus
Village of Menomonee Falls campus
City of Waukesha campus

Libraries

Waukesha County Federated Library
System

Source: Wisconsin Department of Public
Instruction and SEWRPC.

Industrial Sites

Industrial Parks (July 2000) **Acres**

<u>Total</u>	<u>Available</u>	<u>Contact Person</u>
6,420	1,454	Mr. Bill Mitchell, President Waukesha County Economic Development Corp. 892 Main Street, Suite D Pewaukee, Wisconsin 53072 Telephone: (262) 695-7901 Facsimile: (262) 695-7902

Health

Waukesha County communities are served by a complete range of health facilities and health facilities and health professionals. Five area hospitals provide expert care to County residents. In addition, nine clinics provide a variety of health services for Waukesha County Communities.

Media

Local Newspapers

- Milwaukee Journal Sentinel, Daily
- Waukesha County Freeman, Daily except Sunday
- Several other weekly community newspapers provide coverage of news and events occurring in Waukesha County.

Economy

1992 Manufacturers and Retail Trade

Number of manufacturing establishments.....1,086
Annual value of shipments*.....\$6,963,700
Number of retail establishments.....1,785
Annual value of retail sales*.....\$3,092,112

* In thousands of dollars
Source: U.S. Bureau of the Census

Utilities

Electric Power

- Wisconsin Electric Power Company
Service Information: 1-800-242-9137
- City of Oconomowoc Electric Utility
174 E. Wisconsin Avenue
Oconomowoc, Wisconsin 53066
Service Information: (262) 569-2198

Telephone

- Ameritech, Inc.
Business Service Information:
In State: 1-800-660-3000
Out of State: 1-800-447-7738
- CenturyTel
Service Information: 1-800-644-1840

Natural Gas

- Wisconsin Electric-Gas Operations
Service Information: 1-800-242-9137
Gas Emergency: 1-800-236-9874
- Wisconsin Gas Company
Business Service: 1-800-664-0777
Residential Service: 1-800-242-4035

Solid Waste

- Solid waste collection provided by private collection services
- Solid waste is landfilled at a general use landfill, located within the County, and at two landfills in adjacent counties
- Most communities have initiated recycling programs

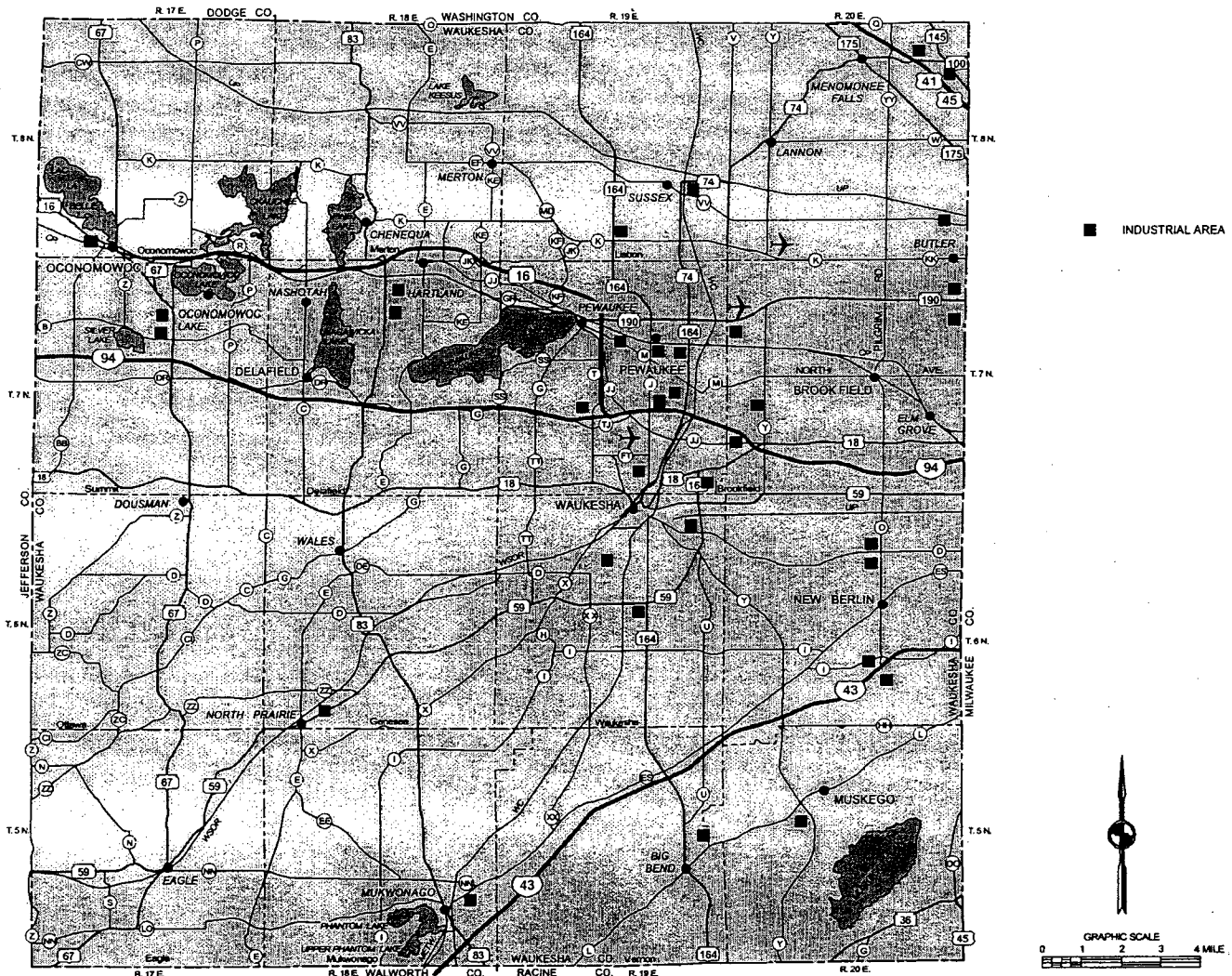
Water

- 14 publicly-owned water utilities in Waukesha County
- Numerous small, private water utilities serve isolated residential and institutional land uses
- Public and private water utilities draw water from groundwater aquifers underlying the County. These aquifers provide an abundant source of high quality water for municipal and industrial uses.

Sanitary Sewerage

- Nineteen sanitary sewerage systems in Waukesha County served by seven public wastewater treatment plants.
- Wastewater treatment also provided to eastern portions of the County by the Milwaukee Metropolitan Sewerage District, located in Milwaukee County
- Public sanitary sewerage systems serve the majority of the County's population. The remaining population is served by onsite sewage disposal systems.
- Most of the communities in the County have completed or are currently undertaking sewer system and treatment plant rehabilitation and expansive programs.

Waukesha County



Local Contacts

- President, Waukesha County Economic Development Corporation
892 Main Street, Suite D
Pewaukee, Wisconsin 53072
Telephone: (262) 695-7901
Facsimile: (262) 695-7902
- Waukesha County Parks and Land Use Department
1320 Pewaukee Road
Waukesha, Wisconsin 53188
Telephone: (262) 548-7790
Facsimile: (262) 896-8071
- Southeastern Wisconsin Regional Planning Commission
P.O. Box 1607
Old Courthouse
Waukesha, Wisconsin 53187-1607
Telephone: (262) 547-6721
- Community Economic Development Agent
University of Wisconsin-Extension
Waukesha County Office
1320 Pewaukee Road
Waukesha, Wisconsin, 53188
Telephone: (262) 548-7770
Facsimile: (262) 548-7787
- Manager-Economic Development
Wisconsin Electric Power Company
231 W. Michigan Street
Milwaukee, Wisconsin 53203
Telephone: (414) 221-3018
Facsimile: (414) 221-3853

This profile is one in a series of regional, county, and community profiles prepared by the Southeastern Wisconsin Regional Planning Commission in cooperation with the Wisconsin Electric Power Company as a community service.



Revision Date: August 2000



APPENDIX C

WAUKESHA COUNTY DAMS

DAM NAME	SIZE	HAZARD CLASS
Wambold	Large	Significant
McClintock Springs	Small	
Paradise Springs	Small	
Highway 67	Small	
Donnelly	Small	
Mukwonago	Large	Significant
Willow Springs Lake	Large	Significant
Southwest Flowage	Large	
Dunlop, Douglas	Small	
Reischl	Large	Low
Hidden Lakes	Large	Significant
Vernon Marsh-Ref. Flowage	Large	Low
Vernon Marsh-Mid. Flowage	Large	Low
Vernon Marsh-N. Flowage	Large	Low
Fraser	Small	Low
Huberty, Robert L.	Small	
West Allis Kennel Club	Small	
Little Muskego	Large	High
Muskego	Small	High
Bischel	Large	Low
School Section Lake	Large	Low
Scuppernong Springs	Small	
Saylesville Roller Mill	Large	Low
Morey	Small	Low
Genesee Roller Mill	Small	
Saratoga Mill	Large	High
Jensen	Small	Low
Girl Scouts Camp Chinook	Small	
Minooka Park	Small	
Abendroth & Assoc. #1	Small	
Abendroth & Assoc. #2	Small	
Hass, Howard	Small	
Blott	Small	Low
Regal Manors III	Small	
Fountain/Square	Small	
Waterville	Large	Low
Upper Nashotah	Large	Low
Lower Lake Nemahbin	Large	Low
Oconomowoc Lake	Large	Significant

DAM NAME	SIZE	HAZARD CLASS
Delafield Fish Hatchery	Large	High
Salow Lake	Large	Low
Nemahbin Roller Mill	Small	High
Pewaukee	Large	High
Monterey	Large	Significant
Okauchee Lake	Large	Low
Peacock	Large	Low
Lake LaBelle	Small	Significant
Agnew, Donald P.	Small	
Merton Rolling Mill	Large	Significant
Monches	Large	Low
Funks	Large	Significant
Beaver Lake Outlet	Small	Low
Lake Keesus	Small	Low
Czerwinski, Leroy M.	Small	
Lepper	Small	Significant
North Hills Country Club	Small	Low

APPENDIX D

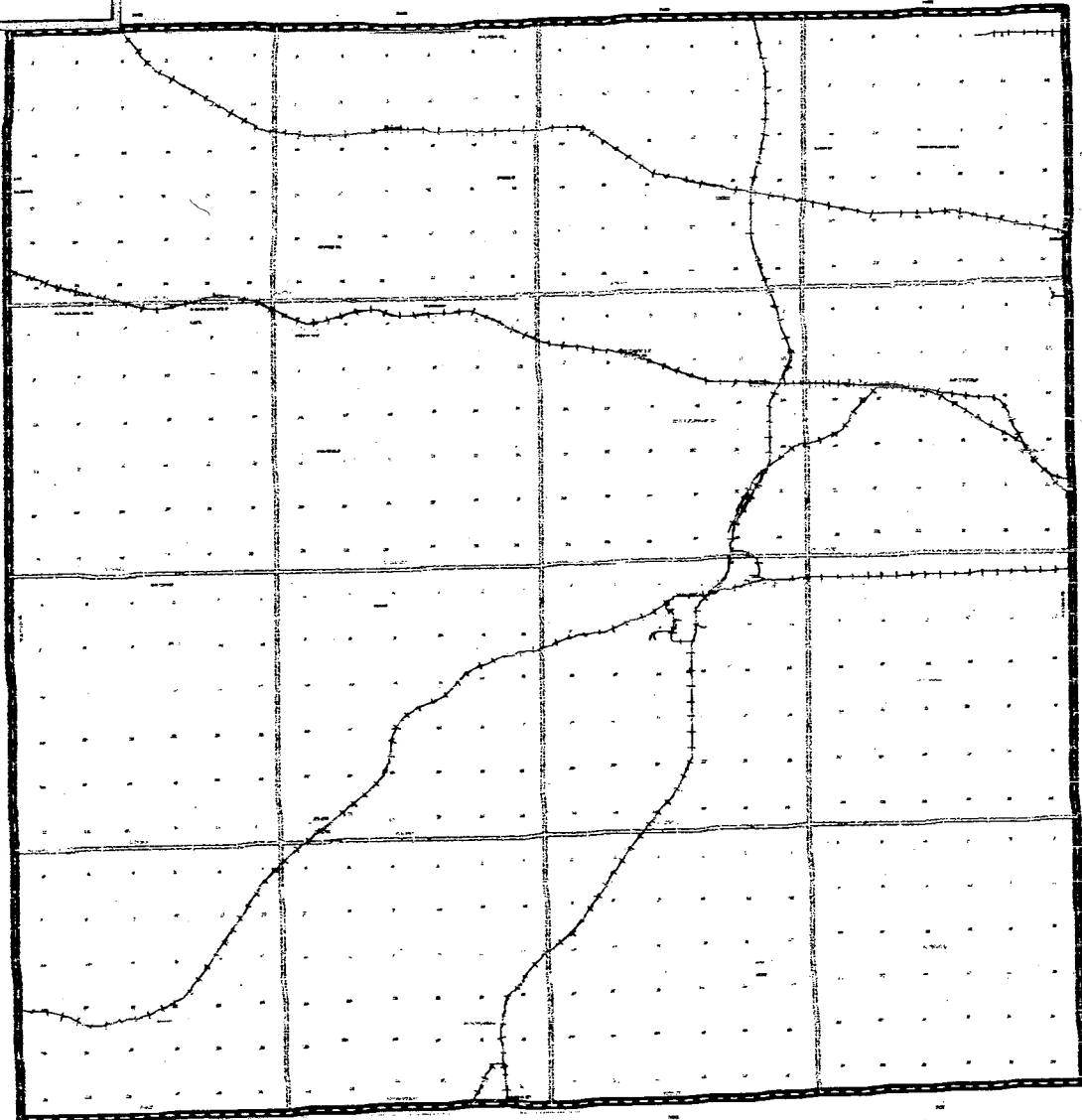
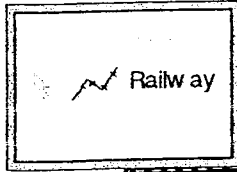
EARTHQUAKES IN WISCONSIN

LOCATION	DATE	MAXIMUM INTENSITY	RICHTER SCALE
Kenosha	10/12/1899	II	3.0
Marinette	03/13/1905	V	3.8
Shorewood	04/22/1906	II	3.0
Milwaukee	04/24/1906	III	---
Marinette	01/10/1907	III	---
Beloit	05/26/1909	VII	5.1
Madison	10/07/1914	IV	3.8
Madison	05/31/1916	II	3.0
Fond du Lac	07/07/1922	V	3.6
Madison	10/18/1931	III	3.4
Stoughton	12/06/1933	IV	3.5
Dubuque	11/07/1938	II	3.0
Thunder Mountain	02/09/1943	III	3.2
Milwaukee	05/06/1947	V	4.0
Lake Mendota	01/15/1948	IV	3.8
Oostburg	07/18/1956	IV	3.8
South Milwaukee	10/13/1956	IV	3.8
Beaver Dam	01/08/1956	IV	3.6
Bill Cross Rapids	02/28/1979	---	<1.0 MoLg
Madison	01/09/1981	II	---
Madison	03/13/1981	II	---
Oxford	06/12/1981	IV-V	---
Milwaukee	02/12/1987	IV-V	---
Milwaukee	02/12/1987	IV-V	---

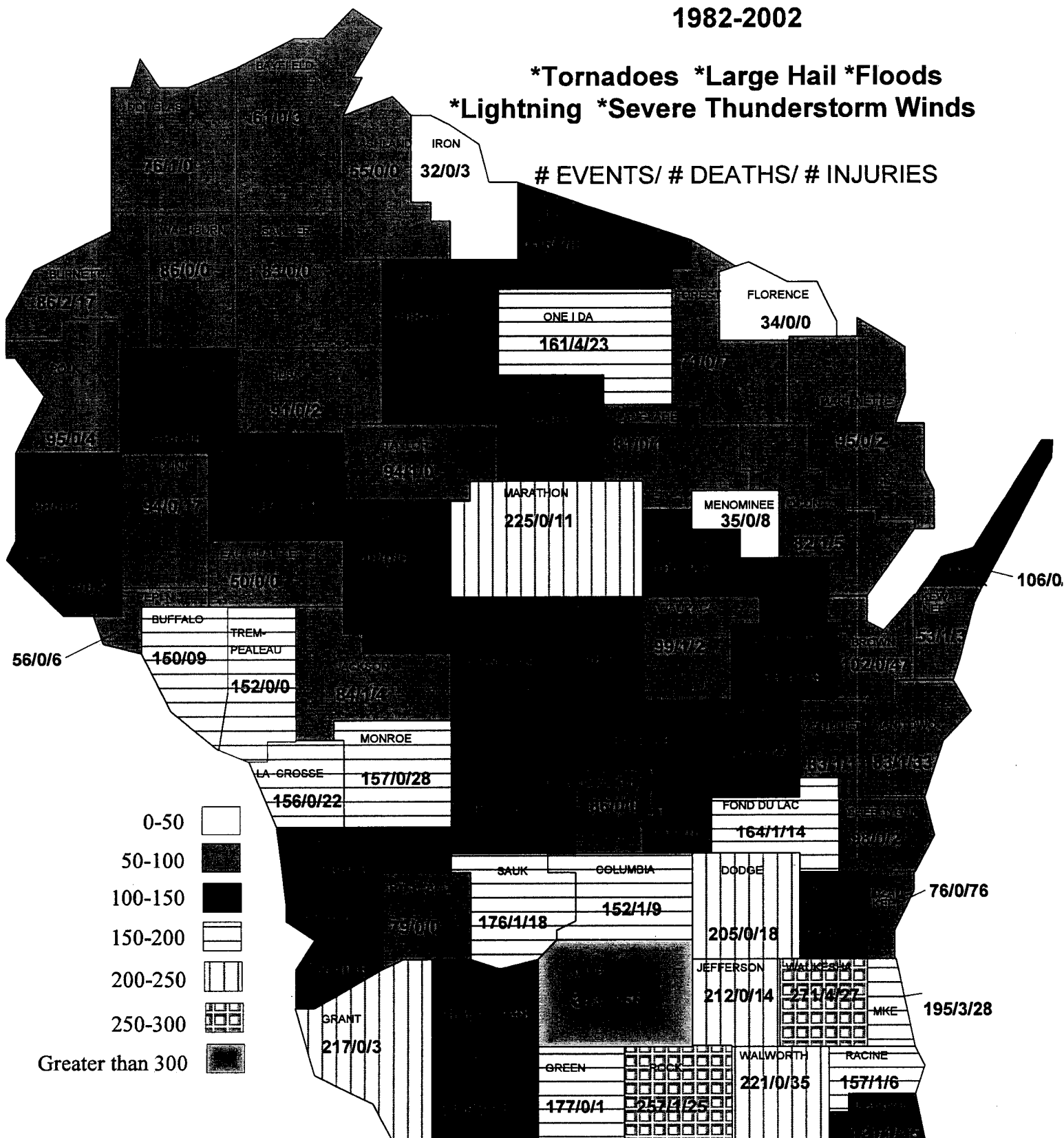
Source: University of Wisconsin-Extension, Geological and Natural History Survey, List of Earthquakes in Wisconsin, M.G. Mudrey, Jr.

APPENDIX E

Waukesha County Rail Routes



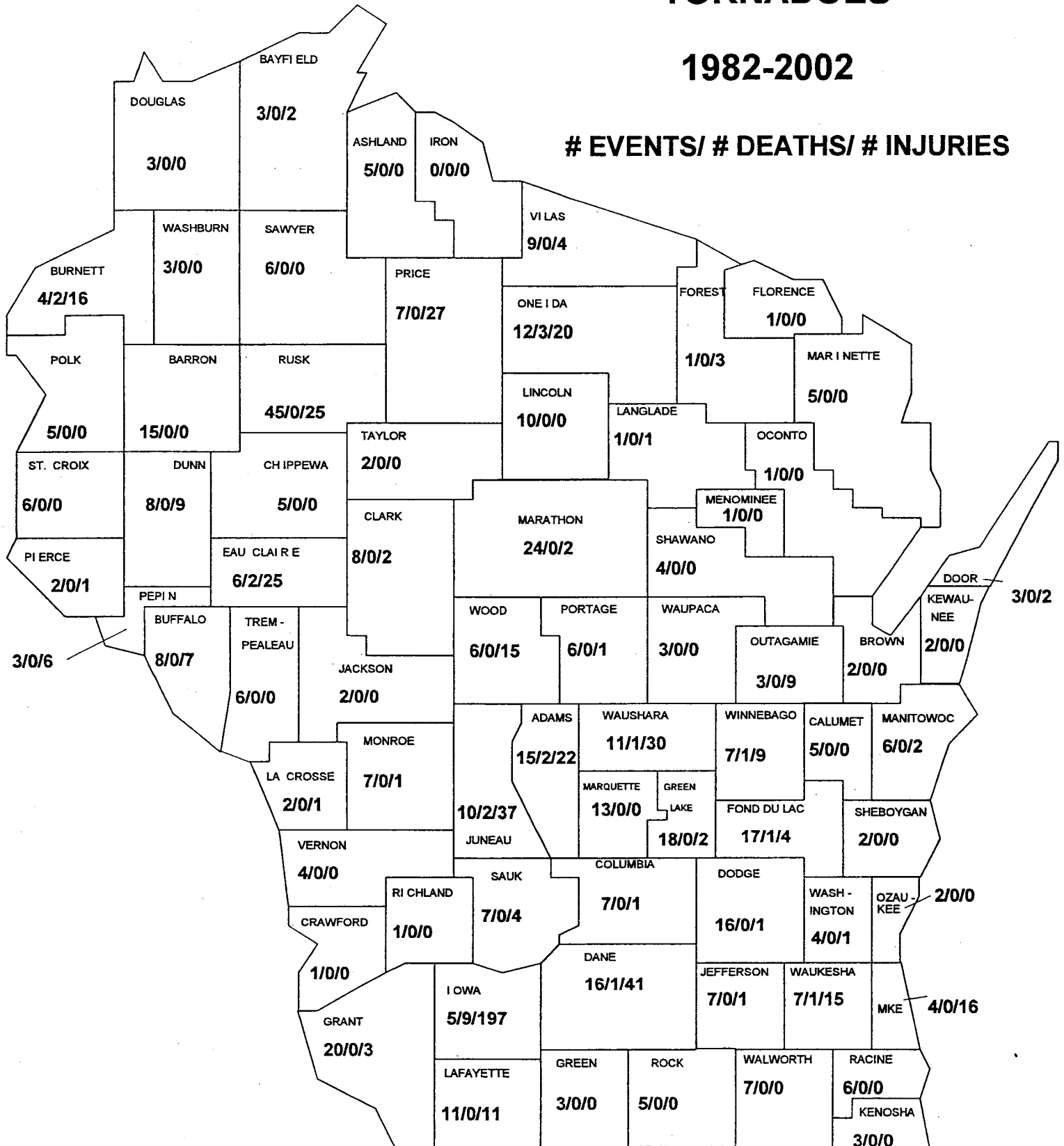
EVENTS/ # DEATHS/ # INJURIES



TORNADOES

1982-2002

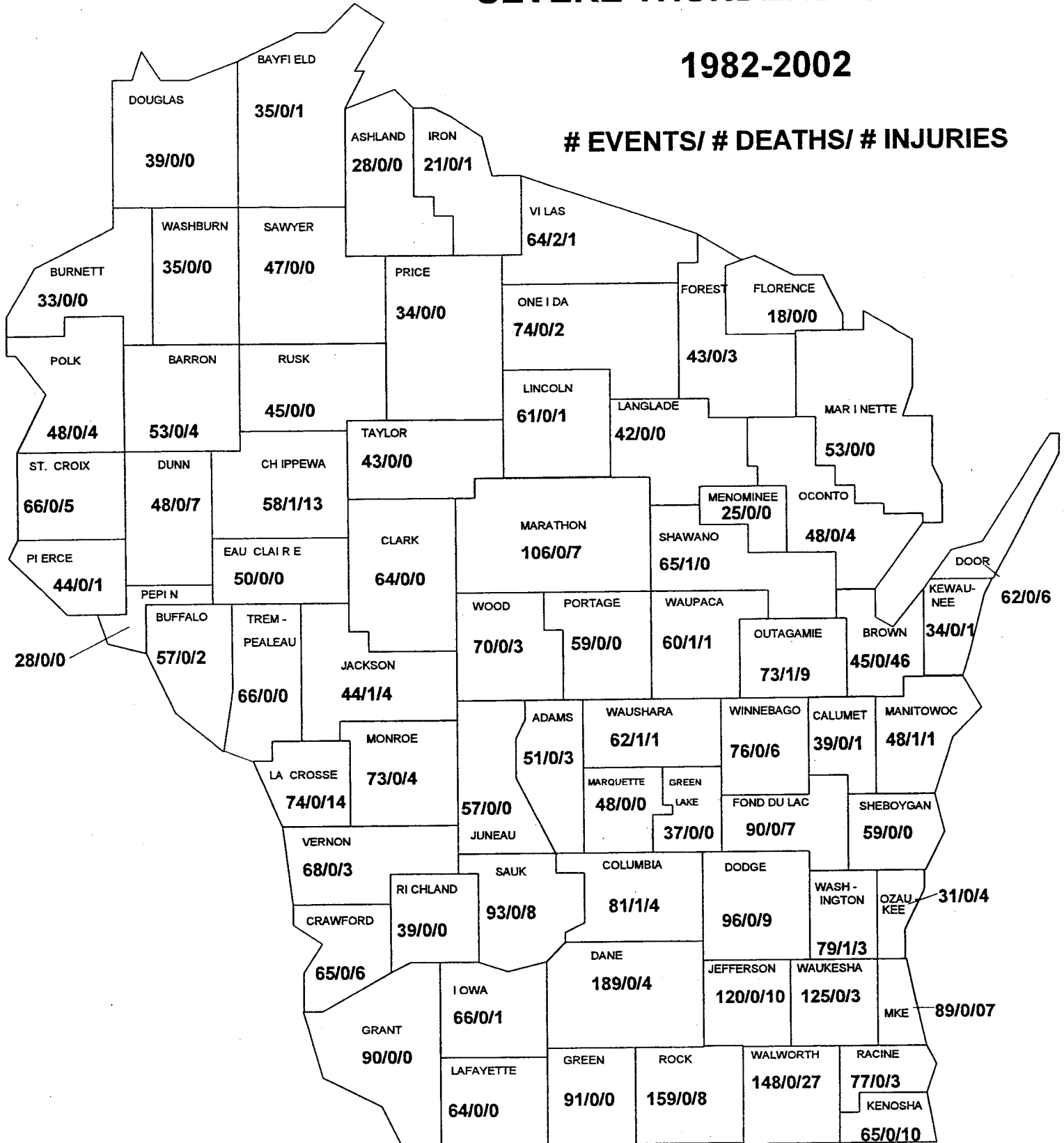
EVENTS/ # DEATHS/ # INJURIES



SEVERE THUNDERSTORM WINDS

1982-2002

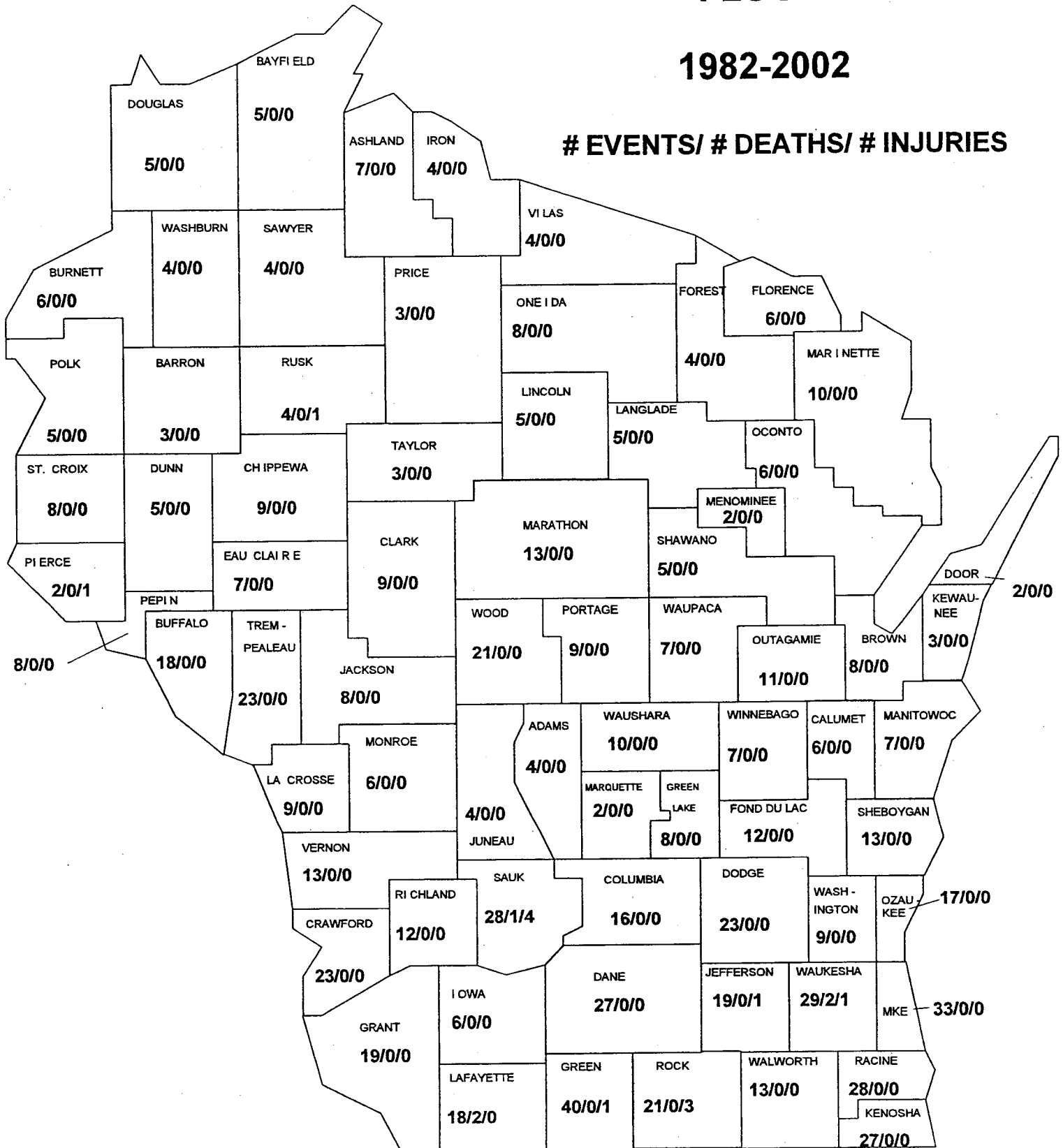
EVENTS/ # DEATHS/ # INJURIES



FLOODS

1982-2002

EVENTS/ # DEATHS/ # INJURIES



1982-2002

1982-2002

EVENTS/ # DEATHS/ # INJURIES

County	Events / Deaths / Injuries
DOUGLAS	5/1/0
BAYFIELD	1/0/0
ASHLAND	1/0/0
IRON	2/0/2
VILLAS	4/0/1
WASHBURN	13/0/0
SAWYER	2/0/0
BURNETT	3/0/1
POLK	7/0/0
BARRON	7/0/1
RUSK	1/0/0
PRICE	3/0/0
ONEIDA	9/1/3
FOREST	2/0/1
FLORENCE	1/0/0
MARINETTE	5/0/2
ST. CROIX	3/0/3
DUNN	5/0/1
CHIPPEWA	5/0/0
TAYLOR	2/1/0
CLARK	5/0/2
MARATHON	13/0/2
LANGLADE	7/0/0
OCONTO	4/1/0
MENOMINEE	1/0/8
SHAWANO	7/1/2
DOOR	4/0/0
PIERCE	3/0/0
EAU CLAIRE	2/0/1
KEWAUNEE	2/1/0
PEPIN	0/0/0
BUFFALO	2/0/0
TREMPEALEAU	7/0/0
WOOD	8/0/1
PORTAGE	7/0/0
WAUPACA	7/0/1
OUTAGAMIE	8/0/1
BROWN	14/0/1
ADAMS	3/0/0
WAUSHARA	7/2/4
WINNEBAGO	10/0/2
CALUMET	7/1/0
MANITOWOC	5/0/0
MONROE	6/0/23
LA CROSSE	3/0/5
WINNEBAGO	10/0/2
CALUMET	7/1/0
MANITOWOC	5/0/0
VERNON	3/0/0
SAUK	8/0/2
COLUMBIA	12/0/4
DODGE	14/0/8
WASHINGTON	28/0/5
OZAUKIE	11/0/3
RICHLAND	1/0/0
SAUK	8/0/2
COLUMBIA	12/0/4
DODGE	14/0/8
WASHINGTON	28/0/5
OZAUKIE	11/0/3
GRANT	8/0/0
IOWA	4/2/0
DANE	39/0/10
JEFFERSON	24/0/2
WAUKESHA	60/1/7
MKE	28/2/4
LAFAYETTE	10/0/1
GREEN	3/0/0
ROCK	34/1/14
WALWORTH	21/0/8
RACINE	23/1/3
KENOSHA	10/1/15

HAIL

1982-2002

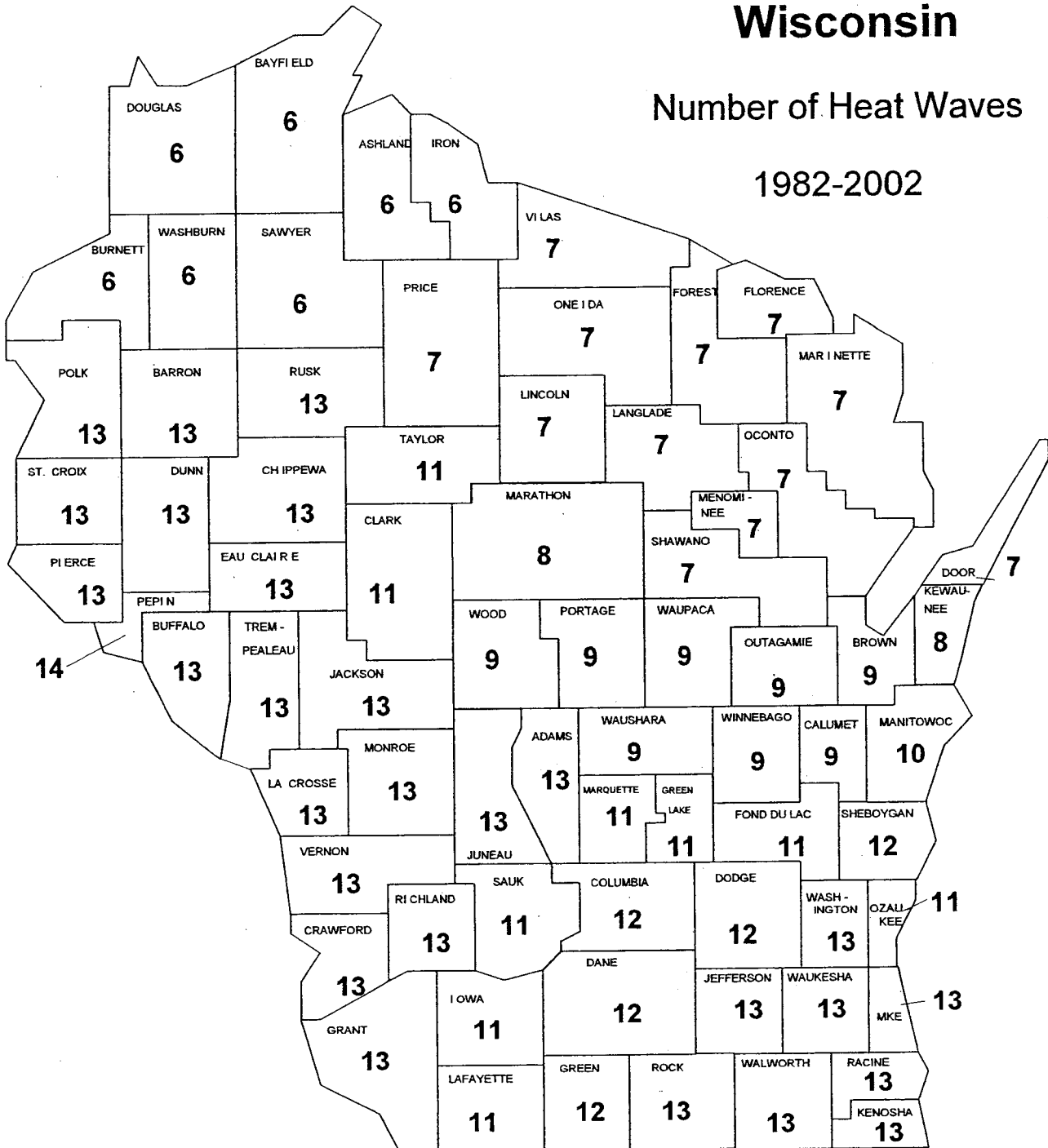
EVENTS/ # DEATHS/ # INJURIES



Wisconsin

Number of Heat Waves

1982-2002

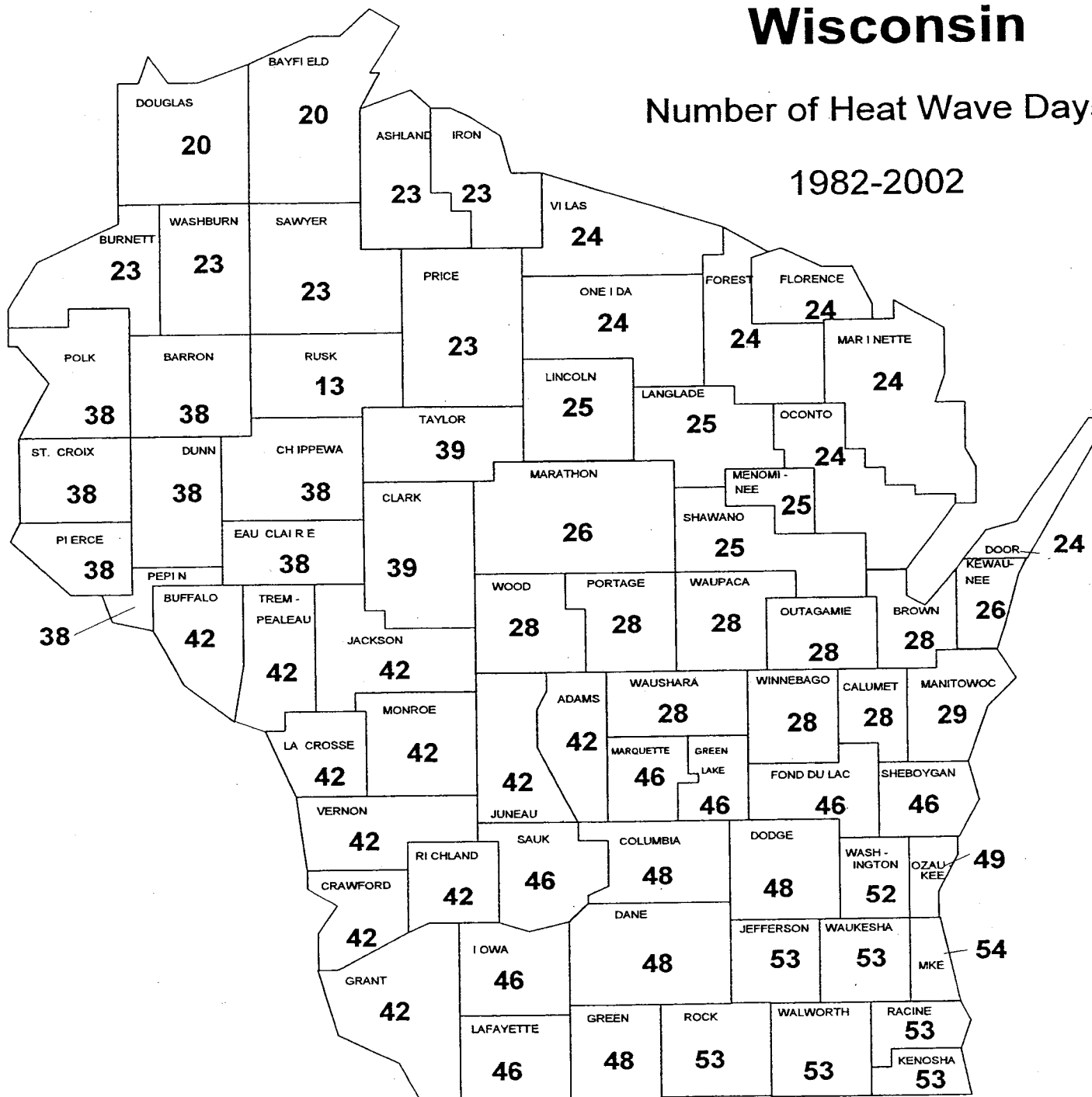


Heat Wave: Period of time (at least 24 hours) in which daytime Heat Index values are 105 or higher for 3 hours or more, and night time Heat Index values are 80 or higher

Wisconsin

Number of Heat Wave Days

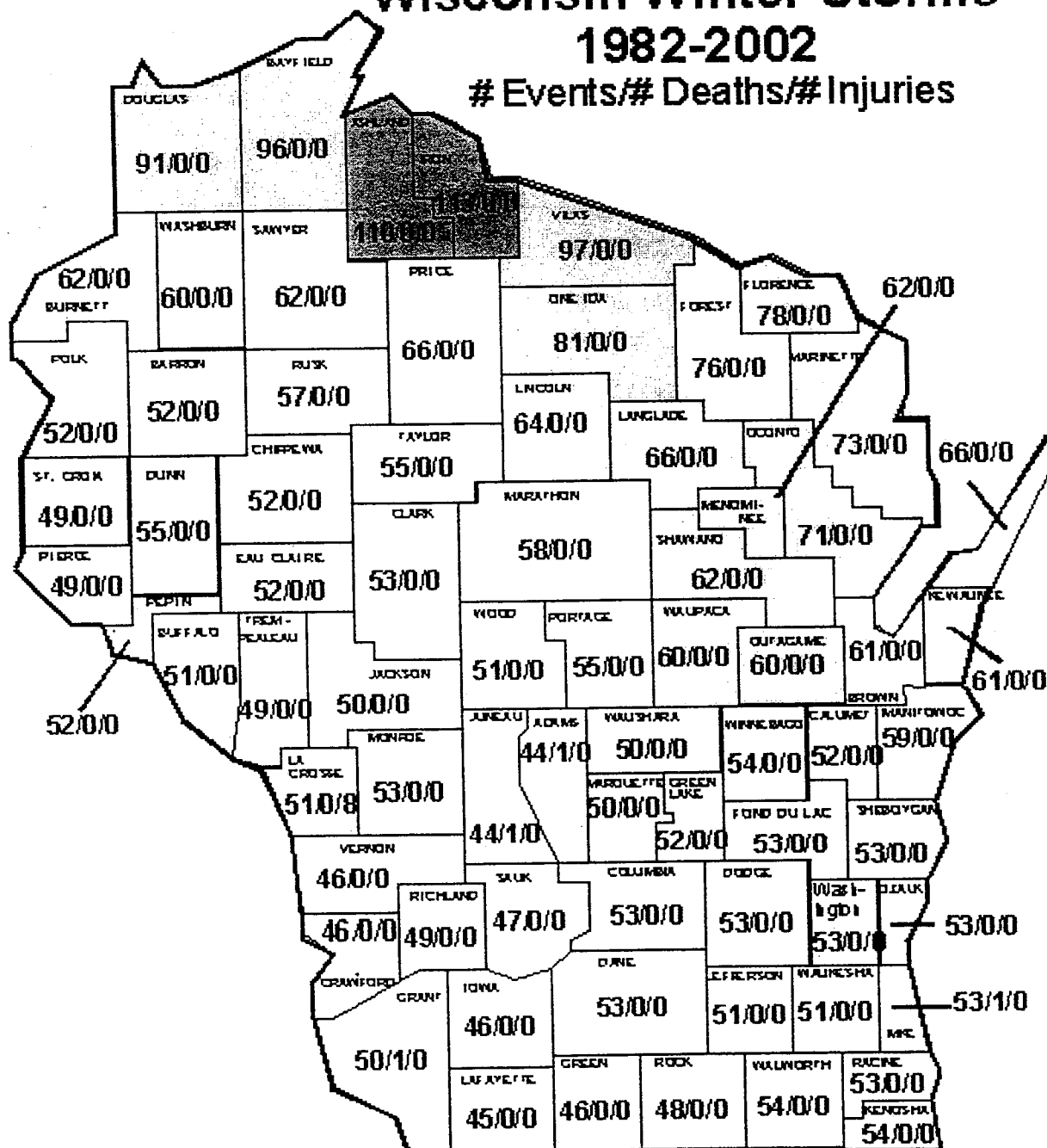
1982-2002



Heat Wave Day: any calendar day (or portion) in which Heat Wave conditions were observed. Heat Wave is defined as a period of time (at least 24 hours) in which daytime Heat Index values are 105 or higher for 3 hours or more, and night time Heat Index Values are 80 or higher

Wisconsin Winter Storms* 1982-2002

Events/# Deaths/# Injuries



*Winter Storm & Heavy Snow (light winds) Events are Combined
Blizzards & Ice Storms are not included

Wisconsin Severe Weather Myths

Tornadoes...

Myth: Thunderstorms and tornadoes fall apart when they get close to Lake Michigan, therefore, if you live close to the "Lake", you are safe from tornadoes.

Fact: On July 18, 1996, two tornadoes spun up over Ozaukee County, and proceeded to march right out over Lake Michigan. Whereas the cooler, more stable air over Lake Michigan, or other large lakes, may dampen the strength of marginally severe thunderstorms, the "Lake" has no effect on the more intense, super-cell, tornadic thunderstorms.

Myth: The "Ledge" found south and east of the city of Fond du Lac steers tornadoes away from, or prevents them from affecting eastern Fond du Lac county. Similar myths exist for Blue Mound, the Baraboo Bluffs, and other local hills, low ridges, river valleys, and inland lakes across Wisconsin.

Fact: On July 18, 1996, a violent F4 to F5 tornado tore through Oakfield, and then moved east up the "Ledge" before dissipating near Eden. The more powerful, supercell, tornadic thunderstorms can generate a tornado anywhere....even on 10-thousand foot mountains in Yellowstone National Park.

Myth: Tornadoes don't go through urban areas. The tall, city buildings break apart the winds of a tornado.

Fact: Tornadoes can occur in any urban area. In the past few years, tornadoes have visited Miami, Nashville, Oklahoma City, Salt Lake City, and Fort Worth, TX. They have marched right through different parts of the large Chicago metro area. City buildings, even those which are 500 to 1000 feet tall, are too short to have any appreciable affect on tornadic thunderstorms which extend 7 to 12 miles above the ground.

Thunderstorms...

Myth: Thunderstorms always split when they come into Dane County. (I've heard this expression from someone in nearly every Wisconsin County...the splitting is due to some lake, river, hill, ridge, or swamp/bog)

Fact: If thunderstorms are always splitting, and this occurs in every county, where are they going? Severe weather occurs in every Wisconsin county. If it's not happening in your local area, it is happening somewhere else. Law of averages dictates that the square foot you are standing on will experience severe weather... maybe not in your lifetime, but it will occur! Some thunderstorms do split, but not all of them.

Myth: It's just a "severe thunderstorm warning" we have nothing to worry about until "they" issue a tornado warning.

Fact: Thunderstorms can generate powerful, hurricane-force, straight-line winds (downbursts) that can result in damage equivalent to an F1 or F2 tornado. In the more extreme cases, thunderstorms wind gusts to 100 to 130 mph have occurred in Wisconsin (July 4, 1977 in northern Wisconsin, May 30-31, 1998 in southern Wisconsin, and August 5, 2000 in Rock County, to name a few). Hurricane-force winds (74 mph or higher) can be expected on 4 days each summer in Wisconsin...treat Severe Thunderstorm Warnings as if they were tornado warnings....and be aware of the danger of lightning!

Flash Floods...

Myth: Large, urban areas or cities don't have flash floods.

Fact: In the past 4 years, various parts of the cities of Kenosha, Racine, Milwaukee, Port Washington, Sheboygan, Janesville, Madison, and Eau Claire have experienced flash flooding. Rainfalls of 5 to 12 inches in a 6 to 8 hour period have generated dangerous flash flooding conditions in these cities. Paved roads, parking lots, and concrete ditches don't allow the ground to absorb the runoff. Urban areas actually amplify the affects of any flooding!

Heat Waves...

Myth: Wisconsin doesn't have heat waves.

Fact: During the summer of 1995, two major heat waves resulted in about 150 deaths (direct and indirect), far more than tornadoes. In July 1999, there were 12 heat-related deaths...mostly from urban areas. Heat waves in mid-July to early August, 2001 resulted in 10 Wisconsin deaths.

